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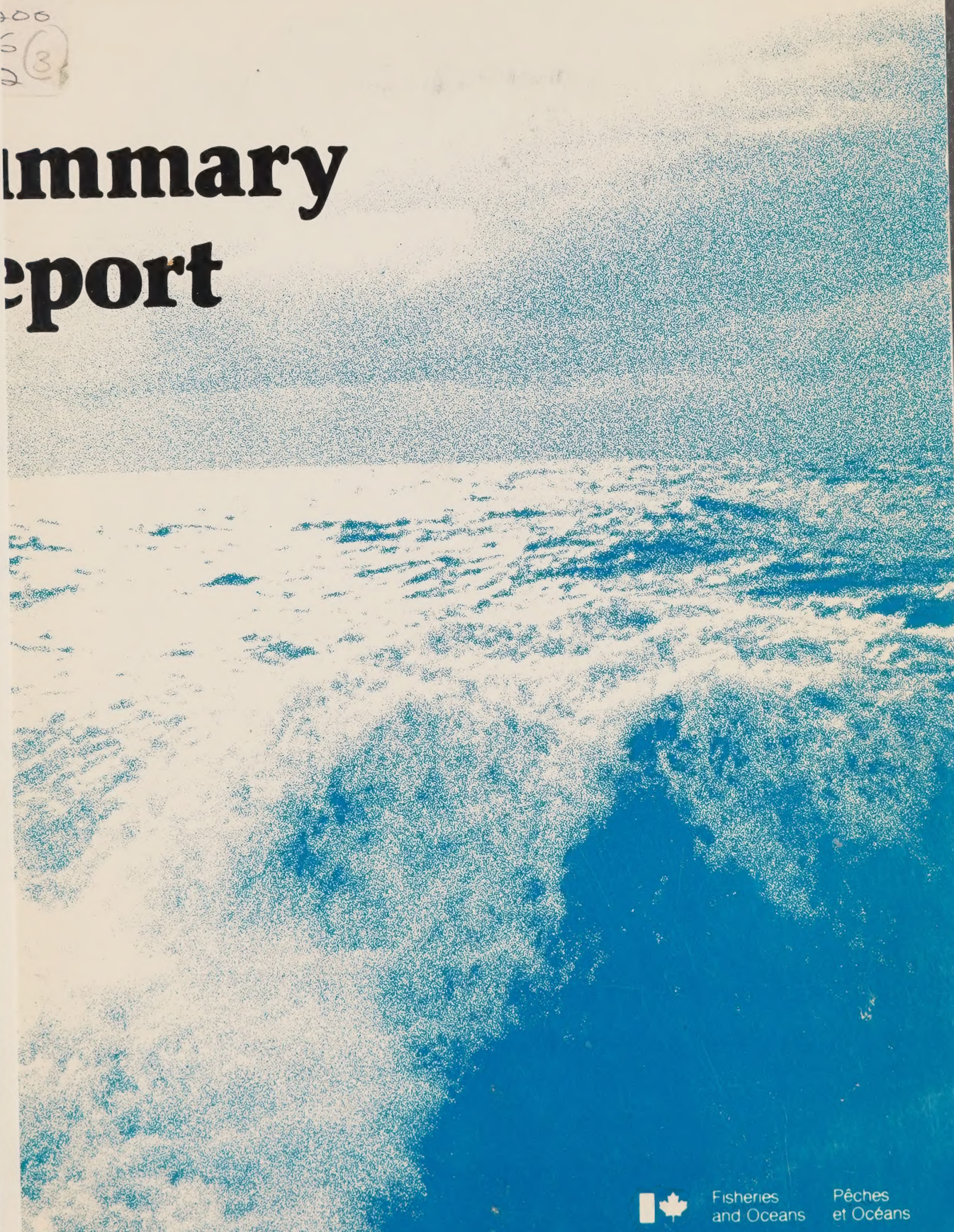
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# OCEANS FORUM

ISSUES AND OPPORTUNITIES ON THE OCEANS FRONTIER

## Summary Report

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Fisheries  
and Oceans

Pêches  
et Océans







# OCEANS FORUM

ISSUES AND OPPORTUNITIES ON THE OCEANS FRONTIER

## Summary Report

September 15 - 16, 1986



Fisheries  
and Oceans

Pêches  
et Océans

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# REPORT ON OCEANS FORUM

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## PREFACE

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The Minister of Fisheries and Oceans, the Honourable Tom Siddon, convened the Oceans Forum on September 15 and 16, 1986, at the Department's Institute of Ocean Sciences in Patricia Bay, British Columbia.

A diverse group representing industry and universities from all across the country met to exchange views on the theme of the conference -- issues and opportunities on the oceans frontier. The spectrum of interests at Oceans Forum included the petroleum exploration and development industry, fishing, aquaculture, advanced technology manufacturing, a wide range of science-based oceanic services, shipping, ship-building, oceanography and related sciences, and federal government departments with policies and programs involving oceans.

This report provides a summary of the papers and remarks presented, and also the reports of the working groups. The complete texts of the keynote speech by the Minister of Fisheries and Oceans and the opening and closing remarks of the two co-chairmen are also included.



## CO-CHAIRMEN'S STATEMENT

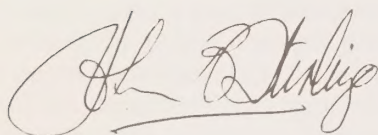
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Oceans Forum provided a unique opportunity for representatives of the oceans sector and government to exchange views and to begin charting a long-term plan for Canada's ocean economy.

Participants at the Forum gave their full support to the Honourable Tom Siddon, Minister of Fisheries and Oceans, in his initiative to develop oceans policies for Canada. The private sector, both industry and the universities, is eager to contribute to the development of these policies in a substantive way. Mr. Siddon assured participants in his closing remarks that he would establish a private sector task force to assist in the development of oceans policies and to advise him on the creation of a permanent advisory council on oceans.

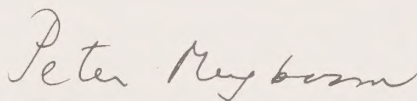
Thanks to participants who contributed their ideas and commitment, Oceans Forum was a great success. The chairmen of the working groups and those participants who made presentations to the conference played an important role and deserve our thanks. Finally, staff in the Department of Fisheries and Oceans who organized the conference and accommodated participants over the two-day period are to be commended.

We expect that this summary report will provide not only a useful record of the discussion at Oceans Forum, but also serve as a foundation for addressing the challenges of Canada's oceans frontier.



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John B. Stirling  
Chief Executive Officer  
Indescor Hydrodynamics Inc.  
Co-Chairman, Oceans Forum



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Peter Meyboom  
Deputy Minister  
Department of Fisheries and Oceans  
Co-Chairman, Oceans Forum

October 31, 1986



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## EXECUTIVE SUMMARY

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Oceans Forum was held September 15-16, 1986 at the Institute of Ocean Sciences of the Department of Fisheries and Oceans, at Patricia Bay, British Columbia. The theme was **Issues and Opportunities on the Oceans Frontier**. Co-chairmen were Dr. Peter Meyboom, Deputy Minister, Department of Fisheries and Oceans and Mr. John Stirling, Chief Executive Officer, Indescor Hydrodynamics Inc.

Oceans Forum was sponsored by the Department of Fisheries and Oceans and attended by 100 representatives from industry, government and universities. Industrial sectors represented include fishing, aquaculture, oil and gas, shipping, ship-building, and oceanic manufacturing and services. University and consultant participants reflected recognized expertise in the field of ocean sciences or ocean law.

The opening remarks by Dr. Meyboom defined the forum as an opportunity to review the interface between government and non-government sectors, the desired outcome of which might be a shared understanding of issues and opportunities pertaining to oceans, a commitment to an ongoing consultative mechanism, and the development of some concrete policy proposals.

John Stirling described the current state of the ocean manufacturing and services sector, pointing to its significant decline over the last two years. He expressed optimism over the potential for a stronger oceans economy based on improved communications among government, industry and academia.

The Honourable Tom Siddon, Minister of Fisheries and Oceans, noted that the forum marks a new commitment of the government towards oceans, which reflects the strong mandate provided him by the Prime Minister with respect to oceans coordination and the development of an oceans policy. The Minister talked about the importance of ocean sciences and the focussing of his department's science efforts to meet the needs of users. To achieve this, he suggested that the private sector needs a strong, collective voice to help government understand its views and incorporate them into policy.

The Minister expressed his wish that Oceans Forum would yield:

- . a clear assessment by the private sector of the status quo in federal oceans policy and coordination;
- . a commitment, a plan and possibly even some machinery for future associated effort; and
- . a plan for systematic communication over the longer term.



The address given by Michael Walker, Director of the Fraser Institute, challenged the role of government in economic markets and questioned whether the public interest is well served by government interventions. He attributes government involvement in oceans to their "common property" nature, which has resulted from the failure to establish private property rights. He believes that oceans would be better managed if the market was allowed to react to natural economic forces. He sees property rights assignment to the private sector as the key to resource development.

Charles Matthews, President of the National Ocean Industry Association in the United States, described the origins and current activities of this powerful interest group. NOIA serves as the legislative and administrative spokesman in Washington for the offshore and ocean-oriented industries. Mr. Matthews demonstrated the benefits to industry of speaking to government in a strong, cohesive voice.

Scott Parsons, Assistant Deputy Minister, Science, Department of Fisheries and Oceans, presented a preliminary overview of the roles of the various federal departments and agencies having involvement with oceans. Program activities were presented under the categories of: marine transportation; marine services; resource development and management; sovereignty, defence and Law of the Sea; northern development; industrial development; and marine science and technology development.

Working groups were convened on both days of the conference to discuss current issues and opportunities, and prospects for government policy development in four broad areas: legal; technological/scientific; institutional; and business/financial.

Peter Berrang, President, Seastar Instruments Ltd., provided an industry view of the need for clarification and rationalization of the ocean mandates of the various federal agencies through a comprehensive Oceans Act and accompanying regulations. He also proposed creation of a national committee, with industry input, to establish research objectives and allocate available funds. Mr. Berrang called for an increased level of contracting-out by government as a means of transferring technology and creating a strong oceans industry.

A university perspective was provided by Robert Fournier, Assistant Vice-President (Research), Dalhousie University, who expressed the view that an oceans policy should fit into a larger science and technology policy, and that high technology should play a larger role in oceans development. He stressed the importance of basic research in universities and the current funding deficiency Canadian universities face as compared to those in the U.S.A.

Louis Tousignant, Assistant Deputy Minister, Policy and Program Planning, Department of Fisheries and Oceans, described the government context for oceans policy. He noted the need to improve industrial support programs, and to obtain industry input on how available funds should be spent. The purpose of the current policy review, he stated, is to improve service and to promote



oceans development, not to reshuffle the activities of federal departments and agencies. This will require a solid factual base covering industry, government and university activities.

Closing remarks were delivered by the co-chairmen. Mr. Stirling identified the three areas where a clear direction for immediate action had been provided by Oceans Forum:

- 1) review and restate our oceans policy;
- 2) establish a temporary structure to help the Minister put into place a permanent consultative mechanism;
- 3) take legislative action so as to establish or clarify rules and focus Canadian interest in oceans.

Dr. Meyboom expressed satisfaction that key proposals had been developed at the Forum. He noted that Fisheries and Oceans had been confirmed as the lead federal department for developing national oceans policy.

Dr. Meyboom stated that while it would be premature to establish a mandate for a national council, he supported the appointment of an interim team. He also agreed that the legislative requirements respecting oceans would be dealt with in a Memorandum to Cabinet putting forward an oceans policy.

In his dinner address, Mr. Siddon congratulated participants on the success of the forum and announced his intention to establish a private-sector committee with a mandate to advise him on a permanent oceans advisory council and on the development of oceans policy.





## OPENING REMARKS BY CO-CHAIRMEN

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### Peter Meyboom

I would like to outline the structure of this conference, why we are having this meeting, and what we would like to achieve. We have to advise our Minister on his mandate with respect to oceans and that is an area where the Department of Fisheries and Oceans has been singularly weak until now.

When I was appointed as Deputy Minister of Fisheries and Oceans, I found in fact two departments: the Department of Fisheries and the Department of Oceans. They worked together at times, but not always. One of my tasks, therefore, was to create one department. We have been trying to do that and I will talk a bit about that now and in the course of this session. It is a marvelous department and I think the junction of the two, Fisheries and Oceans, is going to be of great benefit to the country.

First of all, let me talk about this conference. Today we will be talking about what is going on right now in ocean affairs. Tomorrow we will be talking about the future: what has to be done in terms of providing policies and suggestions for the Minister. The Minister has advised me that he wishes to go to Cabinet sometime in early winter with a number of policy initiatives and this is one of the mechanisms through which we hope to become familiar with your views. We have had very extensive discussions within government and Scott Parsons will speak to you about the outcome of those discussions. Now we are trying to find out about the interfaces between government and the non-government sectors, including universities and industry.

You might say that today we will be talking about today and tomorrow we will be talking about tomorrow.

As you will see from the agenda, we will have presentations today, and this afternoon and tomorrow afternoon we will break up into working groups along four lines, having to do with legal issues, institutional issues, scientific issues and economic issues. John and I will be roaming around to listen. This will be the only moment that I will formally speak until tomorrow afternoon when both John and I will summarize our perceptions from these two days. That session will be attended by the Minister. He also may want to make some comments tomorrow at dinner about what he has learned.

Now, what would we like to accomplish during these days? First of all, a shared understanding. I do not think we know exactly what your perceptions are about the oceans as a business or as a scientific challenge or whatever. Second, a continuing means to talk. I do not think we have had a very good dialogue. I speak to fishermen almost everyday and to oceanographers only occasionally. So, developing some mechanism, be it an organization, an association, an agreement to have some annual conference or whatever, which will enable us to continue to talk. And finally, a number of policy proposals, if you feel that this is possible.

I would like to say a few words about the Department, the Department of Fisheries and Oceans or, if you wish, the Department of Oceans and Fisheries. When I appeared before the parliamentary committee on Fisheries and Oceans, I compared the Department to a watermelon which can be divided into three pieces: on one extreme is science and everything that goes with it; on the other extreme is our policing and enforcement function; and in between is a very large administrative segment that gives support to both extremes. The Department has about 6,000 person-years and a budget of about 600 million dollars. As you may have noted in the budget that Mr. Wilson brought out a year ago, the Public Service as a whole is being reduced and the Department of Fisheries and Oceans has been asked to make a contribution of about 600 person-years to that reduction over three years. We have already surrendered 200 and we have 400 to go. Next week, the Minister will make announcements about where the next reductions will take place and how they are going to be accomplished. The instruction he has given me is to ensure that the scientific part and the enforcement part will not be touched, and that the principal reduction will come out of the middle sector, the administrative support sector. That is what we are endeavouring to do.

I was very sorry, by the way, to see articles in *The Globe and Mail* last week, particularly from some university professors, who were very much afraid that we were going to close down the Bedford Institute of Oceanography, or parts of it. Of course, that is simply not true. It would be very irresponsible and is simply not in the plans. We will amalgamate probably two biological groups, and the Scotia-Fundy area, as it is called, with its headquarters in Halifax and Bedford, will continue to be the largest science part of the department. I do not know where those fears come from. Firstly, it worries me to see scientists speak out against possible measures without knowing what these measures are, and secondly, it worries me to see the press report it without having checked with anybody. It does not make for good communications. In any event, I hope you have taken my word that the emphasis of the cuts is not going to be on science. We cannot afford to diminish that effort.

I spent all last week in Halifax at the annual conference of the North Atlantic Fisheries Organization, which is the international body governing fishing rights in the Northwest Atlantic. In the course of that conference, I realized how important it is to get good scientific advice. It is true, however, that in this department, the Oceanographic Science and the Fisheries Science have been two solitudes and I think that separation has been to the detriment of the country. There are many things that we do not understand which are oceanographic as well as biological in nature. For instance, in the fishery in southeast Newfoundland this year the fishermen tell us that, "the fish are not showing up". Why not? Some put the blame on some magic force, like offshore fishing or foreigners fishing on 'the nose and tail' of the Banks. Yesterday evening, I had a conversation with one of you who gave a very interesting alternative explanation about the relationship between temperature and fish movement. Thus, it appears that these issues have simply not been studied adequately in the Department. I have high hopes with respect to bringing the oceanographer and the fisheries people a bit closer together.



I look forward to listening during the next two days, because that is what I will do and I will report back to you what I have learned tomorrow afternoon. There is a slight change in the program, I understand. The Honourable Tom Siddon, who at the moment is touring this facility, will be speaking to you at 9:30, and before that, I would like to introduce to you the conference co-chairman, John Stirling, who is Chief Executive Officer of Indescor Hydrodynamics Inc. He is well known to you all. He is a prominent figure in the ocean community as he was the father of Fathom Oceanology, which is a company I remember from my days in Supply and Services. I very much look forward to his talk which will be the first of the formal presentations. So, without any further introduction or any further words, I would like to ask John to begin his presentation. Thank you very much.





## OPENING REMARKS BY CO-CHAIRMEN

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### John Stirling

Thank you, Dr. Meyboom. Good morning ladies and gentlemen. It is a real pleasure to be in this beautiful province during Expo year and the weather, of course, has been outstanding. We hope that will last the next few days, at least. Yesterday, the organizers of Expo in Vancouver demonstrated to us that they have achieved something of which we can all be proud. They have shown the world, as well as their fellow Canadians, what Canadians can accomplish. The festivities really brought us a little closer together.

This particular meeting comes at a critical time not only for our country, when you think of some of the issues at stake, but also because of the interests represented by those of us who will participate in this forum over the next couple of days. The Expo experience should remain with us during this conference as a reminder of what we can accomplish and what we must do in order to fully develop our national potential.

We are a representative group of people selected from the industrial and service segments of the private sector. We include survey companies, electronics and mechanical equipment manufacturers for both surface and sub-sea applications, both individuals and corporate entities active in all facets of research and development, and a good cross-section of Canada's academic life. Companies vary in size from single entrepreneurs to significant corporations. As I read the list of people arriving, it looks as though we have about 50 people from the industrial and commercial area, about 21 consultants in a wide range of skills, 10 at least from the academic group, 8 associations and about 32 representatives of government departments.

There are estimated to be 400 companies presently involved in oceanic business, which breaks down to about 200 in various forms of manufacturing, including 75 in electronics, 140 in engineering and surveying services and consultancy, and about 65 in diving. It is estimated that in 1986, total revenues will be about \$275 million. That is down a lot from \$370 million in 1985. Most of the companies represented here that are involved in the oceans business would be considered small-or medium-size on a world scale. That says nothing about their technical and commercial capabilities which, these days, have to be world-class to survive anywhere.

One aspect of this size factor which we experienced during the early days with Oceanic Canada and its predecessor, the Canadian Ocean Industries Association, was the fact that the executives of these companies are tremendously involved in their daily work. It is difficult, especially when times are difficult, to find time to be active on behalf of the industry and to participate in conferences like this. This business time is especially dearly bought.

Later in this program, Charles Matthews, President of the National Ocean Industries Association of the United States will tell you about their very successful group, which might well serve as a model for future Canadian activities. The idea that we need such an association in this country, I do not doubt. How it is to function as a focus of industry and government dialogue might well be a key issue of these deliberations. Let us make sure it is on the list of questions we consider.

Canada's status as a maritime nation is immediately obvious when one looks at a map. We are bordered by three great oceans and have a longer coastline than any other nation. During the second world war, our naval forces played a key role in keeping the sea lanes open between Europe and North America. Although many of our sailors came from the prairies and had never seen an ocean before, their forebearers had, because that is how they got here.

We are a trading nation too. About 25 per cent of our G.N.P. comes from external trade, with a good deal of that, about half, carried by sea. While the world at large might more easily recognize the Suez or Panama Canals, I understand that our own St. Lawrence Seaway carries more cargo than they do put together.

Perhaps another issue of this conference might be to see if we should increase the awareness of Canadians to this aspect of our economic life. I am not sure that the public at large really realizes that we are the maritime nation that we are.

Another aspect of the maritime question, of course, is the country's security. Can we adequately protect Canadian life and property within our maritime boundaries? We are not a warlike country, but this does not mean we can ignore issues of sovereignty, or worse still, rely on others for our own protection. Maybe there needs to be more public presence for Naval Command and more dialogue and debate about issues such as the security of offshore drilling and production activities or foreign intrusion into our fishing territories. The recent arrival of two boatloads of refugees off Newfoundland made some of us wonder about how secure our coastal boundaries really are. When the DND spokesperson reported that on an average day about 2500 ships approach that coastline, one gets some idea of the magnitude of the problem. This aspect of our national concern should be growing, not declining. The 1977 extension of the economic zone to 200 miles effectively increased our land area by one third. We are being explored or tested, if you wish, on many fronts: ice-breakers in the north, unlawful fishing and unexpected immigrants in the east and fishing boundary disputes on both coasts. In addition, public expectations continue to grow.

While this aspect of public awareness is very healthy, it does make more complex the responsibility of our government departments, especially that of Fisheries and Oceans. This is really why we are here today. Many of us have different viewpoints on current issues; some have little thought of overall policy perspectives because of current business problems, but all have a common interest in Canada's ocean resources, their current status, their potential and the obstacles to their ultimate development. In my view, it is imperative that we set up and maintain a dialogue between the participants represented here today so that with our different viewpoints and perspective, we can all add needed input to the process.



My former history professor, Hugh McLennan wrote a book, *Two Solitudes*, which was somewhat controversial at the time. It described, among other things, the divided character of Quebec society and was enlightening even to some of us who lived there. I have thought since then that there are three solitudes in Canadian economic life: industry, the government and the universities. Obviously, none of these is a monolith, although it is often convenient for one sector to describe the other as such. Here is a chance to break down these monolithic attitudes. We have a well balanced and, I hope, well prepared group and above all, a real need and desire to move ahead.

From the point of view of industry, what are the objectives of this forum? First, it is intended to improve our perspective on the government's priorities, policies and viewpoints on oceanic issues. I said before that the government is not a monolith, and we are fortunate to be in dialogue, for today and tomorrow, with the agency that has the major responsibilities in this sector, and the only one whose name, by the way, includes "oceans". This is not to say that other departments in the bureaucracy do not have a role to play, but can we find a way to improve the communication process? Can we assist, for example, in making Fisheries and Oceans, "our department", whether we are a service business, a research organization or a manufacturer of ocean-related equipment? Can all this be done in the context of fiscal restraint which as taxpayers we all demand today? We do not want more procedures and programs --- we want fewer, that work better. We need to understand more clearly how trade-offs are being made now between the often conflicting demands on government. We would like to have some means of providing input as policy changes or policy interpretations are made, because sooner or later they impact on our business. For example, think back to the application of the tariff jurisdiction to the limit of the economic zone and the mixed reaction of those then in the oceans business. I do not think there had been much discussion about that one before it happened, and yet it had a heavy impact, both on the service sector of the industry and on equipment manufacturers. Somebody in the audience is probably saying right now, "It wasn't us. It was Treasury Board". However, maybe "our" department might have smoothed the way for that one before it happened. Too much to hope for? The only way we will get any better is to address issues in a way that serves to develop and present a majority and a minority viewpoint on critical matters.

I think businessmen are a pretty hardy lot. We live in a world of competition and have to be adaptable. Generally speaking, we do not just want handouts from government. We want to have an environment in which we can succeed and prosper. Particularly, we need to know what the rules are. We are not really too good at handling sudden change and surprises, so knowledge of the rules and where they are going is very useful. In order for the procedures for the next couple of days to be effective, we will have to think along strategic lines. While we should focus on real issues, and as far as we can, use real examples, we will also have to focus on the broader aspect of our business needs. In the workshops to follow, we should identify needs and requirements that have real meaning, not just our pet peeves of the day or the week. The representatives of the other "solitudes" will have to make allowance for the urgency that many of us in the industry are feeling. The last few years have not been kind to many in the oceans business, a trend which is presently being accelerated by the current downward trend in international oil prices.

Yet, I believe an endless succession of opportunities remains. The extension of the economic zone to the 200-mile limit which rests partly on the definition of the continental shelf requires more survey work to be sure of the limits. The need for national sovereignty is further accelerated by the outward expansion of the customs limit. New materials, new processes and new technologies are making it easier to explore the untold wealth of our oceans.

I believe that Canadians are resourceful people. We live in a country which has human, financial, cultural and educational resources that are the envy of most, but we always seem to compare ourselves with our great neighbor to the south, by the universal application of the 10-per-cent rule. By the 10-per-cent rule, I mean the oft-made statement that we cannot do this or that because we are only one-tenth the size of the United States. I suggest that we rather model our thinking on some of the smaller countries, which, not knowing about the 10-per-cent rule, have gone ahead to flourish in international markets.

Can we achieve the promise of the future? An essential part of the conference's process will be participation. I hope that each of you will feel free to express thoughts, views, criticisms and some perceptions of the needs that we face together as a nation.

Now I will do my share by sitting down and letting us all get to work. Thank you very much.

## MINISTER'S ADDRESS

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### The Honourable Tom Siddon, *"Canada, the Oceans and the Future"*

Welcome to what I confidently predict will be a most interesting and productive meeting -- one that will mark a new approach and a new commitment to the understanding, use and management of our oceans.

When Prime Minister Mulroney appointed me to the Fisheries and Oceans portfolio some 10 months ago, he emphasized my statutory responsibility for coordinating federal ocean policies and ocean programs. He told me outright that the oceans side of the fisheries and oceans portfolio had been neglected. He then charged me with developing and bringing to cabinet a comprehensive set of proposals for expanding and improving our ocean programs. That's why we're here today.

I'd like to think of the Oceans Forum as an opportunity to make a professional input to the development of the policies which will shape Canada's programs in the coming years.

Circumstances during the past 10 months dictated that I devote the bulk of my time to the fisheries side of my portfolio. So let me take a few moments to establish my credentials as a proponent of the oceans.

I was raised in Drumheller, Alberta -- far from our coastline which, as you know, is longer than that of any other nation in the world. So you might be justifiably sceptical when I claim a long-standing interest in the oceans. But I do.

My graduate studies at the University of Toronto Institute in aerospace studies were the natural culmination of a burning interest in science and engineering -- particularly in the exploration and exploitation of space.

Like many others of my generation, in Drumheller and elsewhere, my fascination with space was fuelled by science fiction writers, such as Jules Verne and Arthur C. Clarke who wrote extensively -- even lyrically -- about the frontiers of space. Of course, I'm talking about both outer space beyond the edge of the atmosphere and inner space beneath the ocean surface.

I would be surprised if many of you here couldn't trace your interest in the oceans back to the adventures of Captain Nemo and the Nautilus in *"20,000 Leagues Under the Sea"*. I was attending high school in Drumheller when the real-life Nautilus -- the U.S. nuclear submarine under the command of Captain J. Anderson -- made its epic voyage of ocean exploration, under the ice cap to the North Pole.



Around the same time, another great science fiction writer, Arthur C. Clarke, was describing his vision of under-sea dairy farms using great herds of domesticated, milk-producing whales to feed the world of the future. Clarke imagined domesticated killer whales analogous to sheep-dogs guiding the under-sea herds through the pastures of kelp and plankton.

So the long-standing interest in outer space apparent in my last job as science minister is in fact matched by an equally long-standing interest in inner space.

I built on this experience as a faculty member of the Department of Mechanical Engineering at University of British Columbia. Professor Tom Osborne from the Institute of Oceanography and I worked together to develop an under-water shear-probe for measuring the velocity components of undersea turbulence. The probe would be dropped through the thermocline layers and relay data through a cable. I even got to go out on some sea trials. I still receive some modest -- very modest -- royalties on the patent we took out. I'm glad to say that Tom and his students are continuing the line of research we started about a decade ago.

I'm going into all this to convince you that I feel right at home here at I.O.S. -- just as I feel right at home at Bedford or Nanaimo or St. Andrews or St. John's and when I speak to those of you who are in the business of developing equipment for use in the oceans. I am deeply committed to advancing your professional interest, not only as a Minister carrying out the Prime Minister's mandate, but on a more personal level.

As a perhaps more tangible expression of this commitment, I can tell you that when asked to rationalize the Department of Fisheries and Oceans in conformity with the government's restraint program, I insisted on protecting ocean science.

This might be an appropriate place for me to comment on the charges which I'm sure many of you saw in the *Globe and Mail* the other day. I'm talking about that article which said we were cutting back our commitment to ocean research. Let me assure you here and now that this is not the case. I intend to reduce the overhead burden on the Canadian taxpayer. But I don't want these cost-savings to be at the expense of ocean scientists. We are not cutting our scientific effort. Science is the basis of this department. I am committed to focussing our scientific effort to meet the needs of our clients in oceans as well as in fisheries.

Scott Parsons, our Assistant Deputy Minister for Science, is going to give you a very thorough briefing on federal ocean activities later this morning. Your other speakers and your workshops will examine the gamut of issues and opportunities on the oceans frontiers. I look forward to receiving your reports with great interest.

As a politician as well as an ocean science enthusiast, I should ask you to keep in mind why we need to understand more about the oceans' influence on weather; why we need to extend our knowledge of tides, currents, waves, the polar ice-melt and other features of the ocean environment.

The reasons are practical and of immense importance to the future well-being of all Canadians.

Fisheries and oceans are combined in one federal department because an understanding of oceans is absolutely essential to the management of our fish stocks in the Canadian 200-mile zone. These fish stocks are the raw material base for a Canadian industry which now leads the world in the value of fish exports.

The oceans also play a crucial role in the development of other industries. There's no question, for example, that we must eventually tap undersea energy reserves. We have the opportunity to develop new, efficient and environmentally-sound technologies for the extraction and transportation of undersea oil, gas and mineral reserves.

I need not elaborate for this group. Neither do I need to tell you that the basis for meeting the challenges and opportunities on the ocean frontier already exists in Canada.

A young, vigorous ocean manufacturing industry has grown up on both coasts -- it includes some 50 companies of the so-called "Bluewater Silicon Valley" around this institute. Some of these companies have developed world-class products and sold them to customers around the world.

Today I am announcing a contract between the federal government and a world-class Canadian group: International Submarine Engineering (ISE) of Vancouver. Three federal departments (DFO, EMR and DSS) will invest \$1.3 million over the next two years in ISE's work to extend the depth range of remotely operated submersible vehicles. ISE will design and build a proof-of-concept vehicle complete with the telemetry systems needs to work to depths of 5,000 metres.

The developers of ocean equipment and the users of the ocean have the right to expect that public sector policies, laws and regulations grow out of a clear, coherent vision of Canada's ocean goals. They need the support of specialized public sector agencies that know their business. We have that. But we need better coordination of those services -- a window within the system through which government can see the whole picture.

At least 12 federal government departments and agencies are involved one way or the other in ocean affairs: Fisheries and Oceans, Environment, Energy Mines and Resources, External Affairs, Canada Oil and Gas Lands Administration, Transport Canada, National Defence, National Research Council, Ministry of State for Science and Technology, the Department of Indian and Northern Affairs, the Department of Regional Industrial Expansion and Supply and Services.

We've made a start on coordinating their oceans-related efforts. A government-wide group -- The Interdepartmental Committee on Oceans -- has been formed. Its members represent all the organizations I just listed. Its chairman is Peter Meyboom and its range of interest is as wide as the ocean itself.

I suggest that the private ocean sector **should react!** You already know and pursue your corporate goals. It's time now for the next step -- time to identify those goals and interests which you share with others in your sector. Time to develop your own voice and your own ears so that you can influence the government's ocean policy.

This sector owes it to itself to dedicate part of its time and effort to the work of discovering its common interest -- to building an informed and coherent lobby for ocean affairs.

Let me give you a political statistic to think about: of the 282 members of the Federal Parliament, 69 represent constituencies that border on the ocean proper. That's over 24 per cent of the full house. Not a bad base to build on.

I'd like to see us emerge from this forum with at least three specific results:

1. First and most important, a clear assessment by the private sector of the status quo in federal ocean policy and coordination. I want to know what you think we're doing right, what's wrong, what isn't being done that should be done.
2. I would like to see you come out of this forum with a commitment, a plan and maybe even some machinery for future associated effort.
3. I also hope to see at least a plan, and if possible a mechanism, for future communication between these two sectors -- ocean private and ocean public. Not just sporadic, ad hoc get-togethers, but systematic communication over the long haul.

I expect to go to Cabinet early in the new year with a long-range plan for coordination of the federal government's ocean policies and programs. It will be a plan that reflects this government's belief in the superior ability of the free enterprise system to make things happen. If it is to be that kind of plan, it must incorporate the current thinking of the private ocean sector.

As participants in this forum, you're being asked to help formulate that plan -- to help chart a course for Canadian ocean policy that will lead us toward our goals -- individual, collective and national. You have a chance here to do work of historic usefulness, for the organizations and the sectors you represent -- and for this maritime nation of Canada.

Thank you.



## PRESENTATIONS

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### Michael Walker, "*Market Under the Sea*"

Michael Walker, Director of the Fraser Institute, spoke on the economic framework required to develop and exploit ocean resources.

Mr. Walker presented his view that many market functions in the oceans economy have been replaced by government processes, with the result that the oceans economy lacks the most important economic building blocks that are necessary for the generation of economic activity. The problem, outlined by Mr. Walker, is the failure to devise a mechanism for the assignment of property rights in the oceans territory, with this failure continually inhibiting the intelligent use of the oceans resources.

He noted that there are resources -- petroleum exploration within national boundaries, aquaculture, some shellfish -- where some form of private property rights is recognized, and, in consequence, knowledge and capital are invested to match opportunities. In Mr. Walker's view, it is not by coincidence that economic opportunities are generally found in these areas.

He stated that there is a frequently-held view that the oceans are a common property in a public heritage, with governments acting on behalf of the general public through regulation and control of the activities conducted in this common property area to ensure that abuses of the public heritage do not occur.

Mr. Walker argued that, in practice, this view cannot be substantiated in the Canadian case. In the fishing industry, for instance, fishermen are adept at finding ways around regulatory barriers. Moreover, he suggested, the actions of governments do not always reflect the interests of the general public but frequently of one group or another which the government wishes to assist or favour. Another aspect of common property resources that is frequently held out as a rationale for government regulation is the responsibility to preserve the resource, such as fish stocks, for future generations. Mr. Walker presented the case against this argument. He pointed out that the decision as to whether a resource should be used today or preserved for tomorrow invokes judgements about the value of the resource in the future. And, he suggested, there is no evidence that governments are inherently better forecasters than the private market in making such judgements.

He argued that the oceans are, from an economic point of view, a frontier much the same as the Prairies were a century ago and what is currently proposed under the Law of the Sea convention will delay development of our seabed resources because it will inhibit private allocation of property rights. He also views the kinds of regulatory conditions established for business conduct and transactions under the International Seabed Authority as inhibiting the development of the seabed resources.

Turning to a recent history of the demand and supply pressures on the oceans resources and services, Mr. Walker argued that there has been in recent times a relationship between expansionary monetarist policies and sharp increases in commodity prices. These increases, particularly in oil prices, and popular economic models such as "Limits to Growth", encouraged people to believe that resource prices would continue to spiral upwards. He contended that this view was incorrect because it failed to see that much of the increase in commodity prices was inflationary, due to the current monetary policies, and also because it failed to take into account the tendency of economic markets to move toward equilibrium. The high energy prices of the 1970s, for example, signalled to consumers that they should consume less energy, which they did, and for suppliers to supply more, which they did, and both reactions resulted in a lower price for energy.

He noted that it was in this period of high commodity prices and expectations that such prices would rise in a linear fashion, that the potential for oceanic resources looked most promising. However, now that commodity prices have collapsed following the slowing of monetary growth and inflation, the prospects are not so encouraging.

Mr. Walker closed his remarks by saying that whether the resources under the ocean are worth anything depends upon the cost of exploiting them and the cost of exploiting alternative sources of supply. His view, after assessing recent history, is that given current technology the resources of the seabed are not an attractive investment at the present. However, he suggested that assigning property rights in the seabed would be an important step in creating an environment where the private market would function and the seabed's potential could then be realized.

## PRESENTATIONS

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Charles Matthews,

*"The Development of the Ocean Industry-Government Interface in the U.S.A."*

Charles Matthews is the President of the National Ocean Industries Association in the U.S.A.

Mr. Matthews outlined the background of the National Ocean Industries Association (NOIA) which grew out of the National Oceanography Association (NOA). The latter had been formed in 1966 as a citizen's group of educators, businessmen, scientists and the public, in order to mobilize overall support for a National Ocean Policy Development Program. He noted that because of its inability to speak with a single voice, due to constant disagreement between the no-growth activists and businessmen, NOA was disbanded in 1971 and was replaced by NOIA in February 1972 with the intention that the new association was to be a clear and unequivocal advocate for the business point of view in ocean affairs.

Mr. Matthews described NOIA as now serving as a legislative and administrative voice for the offshore and ocean-related industries in Washington with the "charge" to promote the common business interests of its members through:

- . encouraging better two-way communications between its companies and the federal government;
- . increasing public understanding of the need for development and utilization of the oceans as a source of food, energy, recreation, pharmaceuticals, and living space;
- . enhancing recognition of the companies' efforts and activities to develop and use the ocean's important resources;
- . supporting legislation and other government actions which are favourable to the offshore and ocean industries; and
- . rigorously opposing actions which are unfavourable.

Mr. Matthews commented that there are currently more than 350 members of NOIA with a governing 45-member board of directors made up of at least two (but not more than six) representatives from specifically named industry groups such as drilling contractors, equipment manufacturing and supply, gas transmission, geophysical contractors, offshore construction, petroleum production, transportation (both marine and air), service companies and shipyards, as well as eight other directors representing companies having an economic interest in offshore development.



He noted that NOIA:

- . is registered with the congress as a recognized federal lobby;
- . holds strongly the view that consolidation of control of the offshore energy industry within a central government represents a danger;
- . has a firm belief in the private enterprise system;
- . attempts to play a role of constructive opposition in putting its views across to the national government;
- . has the political role of convincing the congress that the positions which it advocates are more in the national interest than those of anti-business, no-growth activists; and
- . attempts to ensure economy and efficiency in government programs and policies introduced to address specific problems.

Mr. Matthews concluded by stating that businessmen must be participants in change: it is not enough to just monitor it. It is NOIA's commitment to active involvement which has made it successful and which provides a potential formula for success for other business groups.

## PRESENTATIONS

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### Scott Parsons, *"An Overview of Federal Ocean Activities"*

Scott Parsons, Assistant Deputy Minister, Science, of the Department of Fisheries and Oceans, presented an overview of federal ocean-related activities.

Mr. Parsons began by noting that the ocean industries which exploit the resources in and beneath the oceans include: commercial fishing; offshore oil and gas; shipping; mining; and aquaculture. These industries are supported by secondary industries including: oil field services; oceanic manufacturing and services; and ship-building and ship-repairing.

Mr. Parsons described the role of government in oceans development as:

- . encouraging economic development;
- . mediating conflicts between ocean users;
- . protecting the common resource base;
- . providing infrastructure for safe navigation; and
- . protecting and defending Canadian sovereignty.

He emphasized the fact that industry and government must continue to work towards building a strong partnership, in order to improve their knowledge of available ocean resources and their management of them.

Mr. Parsons noted that the Prime Minister had requested the Minister of Fisheries and Oceans to prepare for Cabinet an overview of federal policies and programs relating to oceans, in view of the economic potential of Canada's oceans and the numerous and diverse government activities related to them.

The balance of Mr. Parsons' presentation was dedicated to an inventory of federal ocean activities which had recently been conducted by the Department of Fisheries and Oceans with the help of other departments and agencies having oceans responsibilities. The inventory reviewed approximately 70 programs administered by 13 departments and agencies. In his presentation, Mr. Parsons described the purpose for federal government involvement and provided a brief listing of programs in the following areas:

- . **marine transportation;**
- . **marine services;**
- . **resource development and management;**
- . **sovereignty, defence and law of the sea;**
- . **northern development;**
- . **industrial development; and**
- . **marine science and technology development.**

Mr. Parsons made it clear that this was a preliminary review of federal programs that would be subject to considerable interdepartmental discussion before providing an overview to Cabinet.

- **Marine Transportation**

The purposes of federal activities in this area are:

- . to provide a reliable, safe system for marine navigation; and
- . to ensure safety and environmental protection through effective regulation.

Marine transportation is a major focus of federal government oceans activity, with Transport Canada having the lead role. Through the Canadian Coast Guard (CCG), it is responsible for harbour management, navigational aids and systems, ice breaking, and safety regulation and enforcement. Through the Canadian Hydrographic Service, the Department of Fisheries and Oceans (DFO) plays an important role in marine transportation by providing navigational charts, sailing directions, tide tables and other navigational aids.

- **Marine Services**

The purposes of federal activities in this area are:

- . to ensure safe navigation;
- . to support marine commercial and recreational activities; and
- . to protect the environment.

This category includes the Search and Rescue operations of CCG and the Department of National Defence (DND). Public Works Canada (PWC) is the major marine service department within the federal government, providing marine architectural and engineering services to both government and industry on marine works such as docks, wharves, ferry terminals, etc. DFO operates and maintains small craft harbours; Environment Canada (EC) provides the important service of marine weather forecasts.

- **Resource Development and Management**

The purposes of federal activities in this area are:

- . to conserve, protect, develop and enhance the fisheries resource base;
- . to assess the extent of and facilitate responsible exploration and exploitation of non-renewable resources;
- . to prevent and control pollution; and
- . to protect the habitat of marine-based species.

DFO is responsible for programs managing, allocating and controlling marine fisheries. EC also plays an important role in the protection of living marine resources.



With respect to non-living offshore resources, the Department of Energy, Mines and Resources (EMR) through the Geological Survey of Canada maps the geology and resources of the seabed and evaluates its mineral and resource potential. Canada Oil and Gas Lands Administration has responsibility for the regulation of both fuel and non-fuel minerals offshore.

The major role in environmental protection is played by EC, while DFO administers those sections of the Fisheries Act dealing with the protection of fish habitat.

- **Sovereignty, Defence and Law of the Sea**

The purposes of federal activities in this area are:

- . to protect and enhance Canadian sovereignty and economic and political interests; and
- . to ensure respect for Canadian fisheries regulations.

It is difficult to obtain an accurate assessment of federal government expenditures on sovereignty because the sovereignty objectives of activities are often secondary. External Affairs (EA) has the primary role in terms of coordinating Canadian issues relating to sovereignty. Its activities include maritime boundary negotiations, and representing Canada at Law of the Sea proceedings.

Fisheries enforcement activities and our ability to describe the ocean environment and its resources, are a tangible expression of sovereignty assertion. The Department of National Defence (DND) through its Maritime Command provides surveillance and control over Canadian waters.

- **Northern Development**

The purpose of federal activities in this area is:

- . to promote development of northern resources, while ensuring the integrity of the northern environment and the opportunities for native people to pursue a traditional lifestyle.

The Department of Indian Affairs and Northern Development (DIAND) has the lead federal role in marine activities in the North. Its activities include the management, through COGLA, of oil and gas exploration and development, as well as protection of the environment. Other departments with significant activities in the North include EMR, DFO and CCG.

- **Industrial Development**

The purpose of federal activities in this area is:

- to promote the development of ocean-related industries.

The mandate of the Department of Regional Industrial Expansion (DRIE) is to promote industrial development in the manufacturing sector. With respect to the oceanic manufacturing sector, it does this through federal/provincial agreements, such as those which exist with Nova Scotia and Newfoundland on ocean industry development, as well as through programs such as the Industrial Regional Development Program and the Defence Industry Productivity Program.

- **Marine Science and Technology Development**

The purposes of federal activities in this area are:

- to provide scientific information and advice for the management of ocean resources;
- to support scientific research into ocean processes; and
- to promote technological innovation in ocean-related industries.

Marine science activities provide the knowledge and understanding in support of management decisions, regulations setting, design and construction, environmental protection, etc. DFO has the legal mandate with respect to marine science. DFO's activities include: physical and chemical oceanography; marine ecology; fisheries research, resource development research and habitat research. Other departments and agencies actively involved in marine science and technology include the offshore geoscience activities of EMR, the marine engineering and marine chemistry and biology programs of the National Research Council (NRC), as well as the Ministry of State for Science and Technology, and the National Science and Engineering Research Council.

In concluding, Mr. Parsons cautioned the audience about the preliminary nature of the inventory which he had just presented and the many ways to portray federal ocean activities. He commented that the federal government expenditures on oceans are significant regardless of how presented. Without taking account of expenditures under federal/provincial agreements, or tax or other fiscal incentives, Mr. Parsons estimated that more than \$1.5 billion is being spent annually.

### **Rick Chandler, "*Titanic Explorations and Technology*"**

Rick Chandler of Woods Hole Institute delivered a very comprehensive and fascinating slide and video presentation on the Titanic expedition. He began by describing the evolution of deep-sea vehicles employed by the Deep Submergence Laboratory in which he works. These vehicles enable scientists to study the ocean bottom. In 1985, their *ARGO* vehicle was one of the most advanced deep-ocean exploratory vehicles. It is a towed sled which is capable of giving real-time video TV coverage back to the mother ship. As an indication of the complexity in developing such an advanced vehicle, Mr. Chandler told the audience that almost a year and a half was required just to come up with a cable which would transmit the video signal back up over a distance of thirty thousand feet to the ship. Once developed, *ARGO* needed a target and so in September 1985, Dr. Robert Ballard of Woods Hole, led an expedition in search of the Titanic, the luxury liner which sank after striking an iceberg in 1912 en route from Southampton, England to New York.

The September 1985 expedition was successful in finding the Titanic and getting some fascinating still and video shots of the ship. A second expedition was made in July, 1986 with the use of a more advanced remotely operated vehicle, *JASON*, which allowed pictures to be taken from either side of the sunken ship and not just from above.

Mr. Chandler spoke of future development of the technology utilized in the Titanic expedition. He expressed the hope of the Woods Hole Institute that they could incorporate some of their underwater video work with remote manipulative work being done in other labs across the country in order to link a human operator to a capability at the bottom of the ocean. He referred to this as a 'telepresence'. "What we are trying to work toward," said Mr. Chandler, "is a telepresence that will allow the uninitiated observer to transport himself down there, through the video signal, through the data that we can retrieve, and imagining that he is at the bottom of the ocean, seeing the things that we have been able to see over the past couple of years."





## PRESENTATIONS

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### **Peter Berrang, "*The Industry Perspective*"**

Peter Berrang, President of Seastar Instruments Limited, provided an industry perspective on oceans management.

Mr. Berrang began his talk by stressing the significant impact that oceans have on Canada as a nation, and expressing surprise that we do not have an Oceans Mandate. Canada, in Mr. Berrang's view, needs a comprehensive Oceans Act to coordinate the present fragmented policies of the various federal agencies having some input into or jurisdiction over oceans use. He went on to say that in formulating an Oceans Mandate, there are a number of changes to the present structure of the Department of Fisheries and Oceans Act that need serious consideration. He named four:

- a) Move the non-renewable seabed resources function of EMR to Oceans;
- b) Move the inspection (and perhaps enforcement) function of Fisheries to the Department of Agriculture;
- c) Increase the level of basic and applied research performed by Fisheries and Oceans; and
- d) Enhance the level of technology transfer between industry and government via a stronger "make-or-buy" policy.

He commented that moving the non-renewable seabed resources function to a larger Department of Oceans would probably save money, since it would coordinate expensive logistics requirements with other ongoing Department of Fisheries and Oceans oceanographic programs. Regarding transfer of the fisheries inspection function to the Department of Agriculture, Mr. Berrang pointed to the practice of other countries such as China and the U.K., which have combined departments of Fisheries and Agriculture. He views inspection as being quite separate from other fisheries and oceans functions. He added that provincial government input might be appropriate in the area of enforcement.

Mr. Berrang indicated that his support for increased research in government laboratories stems from his view that the ocean industry is too small to conduct the necessary long-term research programs or the development of new instrumentation requiring expensive basic research. He expressed an opinion that taxpayers' money spent on research is money well spent. However, he suggested that a reallocation of research funds might be required to more adequately meet the priority research needs. This might require a national committee to establish the priorities and identify specific, nationally set objectives. Involvement of industry in such a committee would ensure that research would be demand-driven, and help provide future private sector spin-offs.

Regarding his proposal for an increased level of technology transfer, Mr. Berrang praised the government's "make-or-buy" policy of the early 1970's. He stated that the continuation and strengthening of this policy will help the growth of existing ocean companies, and spark the start up of new companies, new jobs and a feeling of partnership between government and industry. Mr. Berrang proposed that each major government laboratory should have an "industrial liaison" office with a discretionary budget. He suggested that an Unsolicited Proposal type of program for oceans be among the mechanisms for creating a strong and internationally competitive ocean industry.

Mr. Berrang went on to outline his views on an Oceans Mandate. He made the point that while the demands are too varied to have a single objective, there are a number of essential ingredients for such a mandate. He listed the following as government responsibilities (and cautioned that these were not meant to be comprehensive):

- . legislation and regulations for an "Oceans Act";
- . overall oceans policy (with industry input). This includes both the research and non-research components;
- . oceans environmental and resource protection policies;
- . international oceans affairs;
- . oceans services such as information, mapping, environmental forecasting, education (especially for landlocked parts of Canada) and scientific publications;
- . input to and support of National Defence's oceans requirements;
- . promotion of specific high priority areas;
- . make-or-buy policy; and
- . creation of a Canadian procurement policy.

He identified industry responsibilities to include the following:

- . ocean engineering - focus on applied technology and development rather than basic research;
- . commercialize research results developed by government laboratories and focus on selling services/equipment to foreign markets;
- . conduct targetted ocean research, surveys, monitoring and surveillance type work for government laboratories as per the make-or-buy policy;
- . form a strong oceans industry association to enable government to deal with a single representative organization; and
- . participate on a government-industry national oceans policy committee.



The ocean activities which, according to Mr. Berrang, should have a high priority are:

- . aquaculture (R&D only);
- . increased use of satellite technology for collecting ocean data;
- . deep-sea mining and non-renewable resources exploration;
- . development of marine instrumentation;
- . oil exploration service industries and ocean engineering activities; and
- . the Arctic.

Mr. Berrang offered comments on each of these priority areas.

- Aquaculture - There are problems with the present jurisdictional division. Given the need for coordination of a national effort, the research components of aquaculture could be best handled by the federal government. The regulatory and inspection functions are probably best performed by the provinces. With the recent commercial interest in aquaculture, there will be a need for long-term direction and policy guidelines from both levels of government.
- Satellite technology - The expanding use of satellite technology will have considerable impact on remote sensing, shipping, boating, hydrography and resource mapping.
- Ocean mining and resource exploration - Current research on ocean bottom polymetallic sulphide muds and future development of manganese nodule mining may become major marine industries in the next decade.
- Marine instrument development - Since most advances in science are preceeded by the development of improved measurement devices, government should encourage the development of advanced marine instrumentation. While helping the government in its own scientific efforts it will also assist the private sector to supply some of the leading-edge technology in Canada and abroad.
- Petroleum exploration - The recent downturn in offshore petroleum activities should be viewed as a cyclical event. Survival of the Canadian engineering and services firms is essential and the government's objective must be to ensure that when offshore petroleum activity resumes, the work is done by Canadian rather than foreign firms.
- The Arctic - One of the key issues of an Oceans Mandate must be to exert sovereignty over the Canadian Arctic area. A meaningful and continuous level of research activity and exploration is the most effective and least expensive way to ensure sovereignty in the Arctic. The construction of the

Arctic ice-breaker is a major political decision. If the government goes through with it, it could be used for major high profile and effective Arctic Ocean research and survey programs. The implementation of long-term Arctic programs would lend itself to contracting-out to industry. This would create jobs in the private sector and would result in the development of exportable arctic technology.

In concluding, Mr. Berrang stated that the creation of an Oceans Mandate would go a long way towards managing Canada's ocean resources. He added that a stronger interaction between government and industry would help government in formulating policies, and would help the industry in creating additional wealth and jobs.

## PRESENTATIONS

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### Robert Fournier, *"The University Perspective"*

Robert Fournier, Vice-President of Research, Dalhousie University, spoke on the role of scientific research and development of technology in oceans policy.

Dr. Fournier began his remarks by pointing out that an oceans policy fits into the broader conceptual framework of a science and technology policy. He noted that science and technology have an important role to play in the future of the country affecting, among other things, our standard of living and our political independence.

He pointed out that Canada has had a natural resource-based economy, but the Third World is becoming increasingly competitive in these products. Newly developed countries such as Korea and Singapore, he added, are rapidly developing a strong capability in technology-intensive industries.

He noted that computer technology has dramatically changed our society with its rapid processing, storage, retrieval, and distribution of information, and that many knowledgeable people argue that the future wealth of the developed countries will be based not on natural resources or manufacturing but on information -- its newness, distribution, manipulation, and so on. Information can take many forms, ranging from a song to a chemical formulation; the key point is that it is a saleable commodity. For example, information can be used to engineer genetically a fish to live longer and grow faster. Or it could be used to develop a physiological mechanism to offset the codworm.

Dr. Fournier stated that Canada has not done very well in developing and applying technology. According to the OECD, Canada contributes only about 2 per cent to the world stock of technology. We fall fifteenth among 24 developed countries in terms of our ability to compete in the international market place of high-technology products and services. Last year, Canada ran a trade deficit in high-technology goods of \$12.5 billion. That deficit is growing at 15 per cent each year. We contribute only 1.25 per cent of our gross domestic product to R&D, whereas the Americans and Japanese each contribute about 2.5 per cent.

Dr. Fournier presented the view that we are clearly at a turning point where a change is needed in oceans policy. It would not be very fruitful to design a national oceans policy which merely legitimizes everything we have done in the past or are currently doing. We have to look into the future. We have to look for ways to apply high technology in the oceans sector. This requires technological innovation, new ideas, value added, all of which are the product of research, basic and applied. Research, therefore, is an important constituent of a long-term oceans policy. Norwegians are light-years ahead of Canada in aquaculture because they have applied high-technology knowledge and techniques to aquaculture in a concerted way.



He made the point that basic research is the lifeblood of every R&D enterprise. There are 14 institutions in Canada which account for 75 per cent of the basic research done. About four, or perhaps six, account for most of the marine research done. They are all in dreadful shape, lacking research funds and infrastructure. There is definitely a problem in Canada in that we do not recognize the value of basic research.

He stressed that there is a tremendous need to ensure that universities participate fully in developing an oceans policy. The linkages between industry and universities which occur through technology transfer must be improved and strengthened. Only about 2 per cent of all the money spent in Canada by industry on R&D is spent in universities; in the U.S., that rate is 10 per cent. Both sectors, industry and universities, must work with government to focus on long-term goals for an oceans policy. This long-term look into the future must incorporate a capacity for change, because we are in a period where the rate of change is exponential.

Dr. Fournier had a number of criticisms about the 15-year projections made the previous day concerning the oceans sector. He questioned, in particular, the projections that oceans-related research would not increase, that the commercial fisheries sector would grow substantially, and that aquaculture would decline in size. He suggested that these projections should be reviewed.

Dr. Fournier made it clear that a two-day meeting cannot formulate an oceans policy. The three sectors -- government, industry, and universities -- do not talk together often enough. This session will be a success if we keep up the interaction and momentum started here at Patricia Bay. Government is the facilitator, industry is the user, and the university is the producer of ideas. There are many areas for interaction in developing an oceans policy, whether with respect to fisheries, oil exploration, weather forecasting or whatever.

It would be a very positive step, he suggested, if we could develop a mechanism where the three sectors could talk in an ongoing way. He suggested the creation of a council of perhaps 25 or 30 people representing the various sectors, meeting at regular intervals, which would build the basic philosophical foundation of an oceans foundation.

## PRESENTATIONS

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### Louis Tousignant, "*Oceans Policy and Current Federal Priorities*"

Louis Tousignant, Assistant Deputy Minister, Policy and Program Planning, DFO, spoke on the factors influencing oceans policy and the need for a multi-sector policy development mechanism.

Mr. Tousignant noted that the Oceans Forum provided all participants with the unique opportunity to have input into the formulation of an oceans policy. But to have an oceans policy for the sake of having one, he warned, is not sufficient. An oceans policy must lead to programs, which in turn will generate economic activity; an oceans policy must sustain and promote technological development and ultimately create jobs for Canadians.

His remarks centered around three points: 1) the oceans in the general context of government policy and priorities; 2) the development of an oceans policy; 3) the interface between industry, universities and government.

#### 1. The Oceans and Government Policy and Priorities

All ministers, the Minister of Fisheries and Oceans included, must take into account the broad government priorities: economic renewal, restraint measures, and national reconciliation.

These governmental thrusts affect oceans policy inasmuch as they must be taken into account in the execution of all ministerial mandates.

The **economic renewal** priority of the Government has implications in four areas: regulatory reform, trade, tax reform and support to industry.

Regulatory reform effort implies the removal of obstacles to growth. Insofar as the fisheries sector of DFO is concerned, there is presently a review of the regulations governing both the management and inspection sectors of the Department. It is questionable whether existing government regulations were impeding economic growth of the ocean industry.

International trade issues are intertwined with economic renewal. The bilateral trade talks with the U.S., the GATT negotiations, and the Pacific Rim effort are aimed at providing Canadian businesses with access to foreign markets and at reducing tariff barriers. Efforts should be made to expand trade opportunities for the oceans sector. Are there barriers preventing Canadian industries from doing increased business or can steps be taken to assist the oceans industries to compete better in international markets? The working group sessions of the previous day identified some actions needed in the surveys sector and had highlighted the importance of increased access to the U.S. military market.

Another element of economic renewal is tax reform. This is the sole prerogative of the Finance Minister.

The fourth element is government support to industry. This includes programs for universities, DSS unsolicited proposals, IRDP, Defence and DOT procurements, etc. The issue is how these programs can be altered or adjusted to serve better ocean industries needs and address their concerns.

DFO, like other government departments, has curtailed its administrative costs and red tape to be in line with the Government's **fiscal restraint** and responsibility. The challenge is how the government can do more to assist industries, with fewer dollars to spend.

The third global government priority is **national reconciliation**. The political will to enhance cooperation between the federal and provincial governments has had an impact on offshore oil developments. Aquaculture and recreational fisheries are areas where further federal/provincial cooperation can enhance economic prospects for those industries.

## 2. The Development of an Oceans Policy

In order to present Cabinet or decision-makers with viable options, there is a need for hard data on federal program expenditures in the oceans sector. To achieve this, an updated inventory needs to be compiled so as to take stock of the efforts currently deployed to serve industry.

There is a multiplicity of government departments offering services. The purpose of an oceans policy is not to change or scramble the existing governmental network of service and programs, but rather it is to devise ways to serve better the industry and take action that will enhance its development. The development of a global oceans policy framework should assist all parties concerned. This will require input from industries, universities and all interested federal departments.

## 3. The Interface Between Industry, Universities, and Government

There is a need for better interface and communication between government, universities and industry. Should there be an industry association formed to represent its views to government? The Oceans Forum is an important early step in establishing an ongoing consultative process through which industry, universities, and government departments could take concerted action aimed at developing a strong Canadian oceans industry and could lead to the creation of a permanent sounding-board that would advise government first-hand on oceans-related economic conditions, issues and prospects.



## REPORTS OF THE WORKING GROUPS

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Participants were formed into eight working groups which discussed four broad areas of ocean related issues:

- 1) Legal;
- 2) Technological/Scientific;
- 3) Institutional; and
- 4) Business/Financial.

During the first day of working group discussions, participants were asked to focus on current issues and opportunities. On the second day, the focus was on policy development, i.e., what should the government be doing? Each working group was given a number of questions to address. These questions are noted below, along with summary reports to plenary by rapporteurs of the working group discussions.

### DAY 1

#### Legal Issues Working Groups

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##### *Questions*

1. Are Canada's laws and regulations adequate to handle oceans responsibilities?
2. What statutes and regulations will require change over the next few years?
3. Are there areas where simplification is needed?
4. Is Canadian Arctic law sufficient to protect all our Arctic interests?

##### *Report*

Currently, oceans are governed by a complex scheme of fisheries regulations and oil and gas regulations. However, beyond these areas, the legal aspects are less clear. In fact, there are legislative gaps. For example, no legislation exists to deal with an Exclusive Economic Zone. Neither do we claim all of the jurisdiction to which we are entitled in our contiguous zone. The legislative framework for aquaculture is inadequate and the approach to oceans legislation piecemeal.

There is need for rationalization of fisheries legislation. The lack of coordination of laws imposed by different levels of government is a problem for industry. This is particularly evident in the area of pollution control.

Arctic law is perhaps so thorough and overly protective that it inhibits resource and economic development. Regulations formulated and tailored for mega projects may be inappropriate for more common smaller ventures.

### Technological/Scientific Issues Working Groups

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#### *Questions*

1. What major technological and scientific issues are likely to emerge in the next few years?
2. Do we currently have the right mix of government, industry and university activity in ocean science, and are their respective priorities consistent?
3. Is the federal government doing an adequate job of collecting and disseminating marine information?

#### *Report*

Canada has a "shotgun" approach to scientific research. It is difficult to identify where the demand for scientific R&D is coming from or if supply is meeting that demand. In the absence of offshore petroleum activity, the demand will probably come from the U.S. military, sovereignty assertion and foreign offshore petroleum development.

Opportunities to use high-technology developments exist. For example there could be a greater use of biotechnology in aquaculture development. Remote-sensing could also play an expanded role in oceans development and management. In general, there seems to be a lack of recognition of the importance of long-range R&D.

The mix of government, industry and university activity in ocean services is probably not the right one. The government is dominant and appears to be dictating to others. Industry and universities are simply being responsive. There is need for more coordination of activities, more collaborative research and improved communication among the three groups. Given the limited funds available, a better focus is also needed.

The federal government is generally doing a good job collecting and disseminating marine information but there is insufficient private-sector involvement in information dissemination. If information dissemination is to remain in government, it should be accessible through a single "user-friendly" window.

## **Institutional Issues Working Groups**

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### *Questions*

1. What problems exist in coordination between the private and public sectors?
2. Is there adequate coordination within government in matters relating to oceans?
3. Are government services adequate for industry to realize its potential?

### *Report*

Coordination problems are numerous. There is insufficient opportunity for the private sector to influence policy. The university sector is being almost totally ignored. There is a lack of common goals, particularly with respect to scientific research. In fact, there is an impression that there is competition between public and private sector R&D.

There is an inadequate definition of mandates and lack of coordination among federal departments and agencies. There is a great deal of overlap in government activities, making contact by the private sector even more difficult. Perhaps there should be a small autonomous group within the government to serve as the point of contact for the private sector.

"Hard" government services such as navigation charts and aids, ocean research, weather forecasting, etc., are generally adequate. However, there may be too many services offered by government. Industry might be prepared to take over some services which are currently provided by government. Consideration should be given to the establishment of a committee to review which services are necessary and whether government or industry should provide them.

## **Business/Financial Issues Working Groups**

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### *Questions*

1. What prospects face various sectors of the ocean economy?
2. What are the main business/financial issues likely to emerge in the near future?

### *Report*

- Fisheries:
  - The current market is good, but production from aquaculture could deflate prices.
  - Fleet replacement will become an issue, i.e., who will assume the cost?



- Aquaculture
  - . What should the DFO role be? How should Canada react to foreign technology?
  - . With regard to competition between aquaculture and wild fisheries, it is important to remember that aquaculture will not produce many new jobs.
  - . An important legal issue, with investment implications, is whether a fish in a net is private property.
- Oil and Gas
  - . There is still scientific and technological work to be done. The government and industry must work together to ensure that it is completed, even during the current period of inactivity created by low oil prices.
- Mining
  - . The legislative void in offshore mining is impairing that industry's ability to proceed.
- Ship-building
  - . In the short term, the ship-building industry will require more government assistance.
- Defence
  - . Several major expenditure programs are currently underway; however, concern was expressed with DND priorities. Industry wishes to have input to military studies. The export market potential must be recognized, and an export program developed.
- Oceanic Manufacturing and Services
  - . The industry is currently in poor shape due to the decline in oil and gas activity and the constraints on government spending. The diversion of federal money into the space station has further hurt the ocean industry.
  - . There was an acknowledgement that the government has put many companies into business through its demands for goods and services, but has not sustained them.
  - . There is a need to review the appropriateness of financial support programs such as IRAP.

## DAY 2

### Legal Issues Working Groups

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#### *Questions*

1. Should Canada ratify an Exclusive Economic Zone?
2. Are there areas where new laws should be developed?
3. What would be the best way to develop the legal regime to enhance oceans economic development?

#### *Report*

The role of a law is both regulative and facilitative. There is need for a body to provide both functions. A National Ocean Policy Council should be established to operate independently of government with its composition reflecting legal, institutional, financial, scientific and community perspectives. Matters for the Council to consider would include:

- . ratification of the Law of the Sea Convention;
- . legislative basis for an Exclusive Economic Zone;
- . rationalization of existing legislation;
- . resolution of trans-boundary problems;
- . definition of outer limits of continental shelf;
- . establishment of a marine scientific research regime;
- . possible legislation to deal with contiguous zones;
- . coastal zone management problems, including collaborative arrangements between the various levels of government; and
- . improved consultation between scientists and lawyers, in support of legal positions relating to maritime boundary disputes.

The primary oceans **policy** goal is the maximization of economic benefits from the sea. The **law** is a secondary consideration which should be used to achieve this goal. There are three legal options to be considered:

- 1) maintain the status quo;
- 2) declare the EEZ; and
- 3) ratify the Law of the Sea.

Either of the latter two would serve to focus oceanic goals and activities.

It was the view of External Affairs that ratification of UNCLOS should be delayed until a number of key issues are clarified (2 to 3 years); however, preparation for ratification should begin now. While Canada's petroleum, fisheries and shipping legislation are already close to the LOS language, no legislation exists with respect to marine science, polymetallic extraction or the contiguous zone. Another area which needs to be addressed through legislation is the protection and transfer of "intellectual" property.

## Technological/Scientific Issues Working Groups

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### *Questions*

1. What strategy should Canada pursue with respect to the development of the oceans sector, e.g., should we aim for self-sufficiency or for specialization?
2. How can government-sponsored research best support Canadian interests in the oceans?
3. What can be done to improve technological development and transfer within Canada?
4. What is the best way to ensure that Canadian industry can take advantage of the scientific and technological development of other countries?

### *Report*

Canada should target those things which we do well and which have potential for good return on investment. To achieve this, a forum is needed to bring together government, industry and universities on a regular basis in order to review opportunities and set priorities. The government should act as coordinator to make this happen.

Some examples of areas where we have capabilities and for which an application exists in Canada include ice, long distances and deep water. Canadian expertise in these areas should be reflected in Arctic technology, remote-sensing and underwater vehicles. Even in the absence of foreign markets, work in these areas should proceed because of the spin-off benefits for Canada. The current decline in offshore petroleum activity should not be allowed to stem scientific and technological efforts in the oceans.

In order to support Canadian interests in the oceans, the government requires guidance from the private sector to formulate an overall program. A small-scale "oceans" forum could serve this purpose.

Unrestricted access to scientific information is fundamental to technology development and transfer. A forum such as the one mentioned earlier would facilitate this access and at the same time would eliminate the apparent competition which currently exists between scientists in the public and private sectors. The technology support programs such as IRAP and the UP fund have to be maintained.

Efforts should be made to assimilate technology from other countries to advance Canadian technology. One way to achieve this is by encouraging joint venture projects with other countries.



## Institutional Issues Working Groups

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### *Questions*

1. What is needed to deal with conflicting uses of oceans?
2. What is needed to facilitate communication among all the parties involved in oceans matters?
3. What can be learned from other countries concerning institutional arrangements?

### *Report*

Ocean resources, their use and related manufacturing and services, have the potential of adding greatly to Canada's economic growth, creation of jobs, and development of regional economies. There are many interests and sectors within Canada with a stake in oceans; however, they lack focus. For this reason, there is need for a mechanism to enable the private sector to advise government on the optimization of opportunities and benefits available from the oceans. Such a mechanism would:

- . provide an opportunity for all players to contribute to national policies and plans;
- . foster communication, understanding and cooperation;
- . anticipate developments and opportunities;
- . encourage and develop ocean industries; and
- . develop and transfer technology.

A complete review of existing policies is critical. DFO has the legislative mandate to take the lead role, however, cooperation with other departments having their own ocean mandates and responsibilities will be required. The science and industrial incentive agencies, MOSST and DRIE, should be closely involved in policy development.

Formulation of a limited-life, private sector, ad hoc advisory committee is recommended to advise the government, through DFO, on ocean policy development and to develop a permanent structure for ongoing consultation, i.e., a National Oceans Advisory Council. Such a council should have representation from all oceans industrial sectors as well as the scientific and education community. It too, should report to government through the Minister of DFO.

A small group should be established within DFO to act as an advocate of science and industry. This group could also perform secretariat functions for the Council.

## Business/Financial Issues Working Groups

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### *Questions*

1. Are there particular actions which government can take to deal with emerging issues in the oceans economy?
2. What is needed to develop markets for Canadian technology, services and products associated with oceans?
3. Should government implement "Canadian content" guidelines for ocean-related equipment technology?

### *Report*

- Policy Development

A single-mission, limited-life, umbrella group should be formed to support the Minister of Fisheries and Oceans in his oceans policy proposal to Cabinet with a liaison officer within DFO appointed to support this group.

- Fisheries

This sector is already well looked after by government; therefore, direct subsidies to the industry should be avoided. Parliament should reaffirm the Minister of DFO's exclusive authority to manage the fisheries.

- Aquaculture

Industry should only have to contend with natural impediments to development such as market, environment or technology. Regulations should not be an impediment. The existing regulatory process must be smoothed and resource ownership clarified.

- Oil and Gas

There is no role for DFO in this sector. However, the dual roles of EMR and DIAND should be consolidated. Compliance with Canadian content guidelines pertaining to the petroleum industry present a significant administration burden.

- Ocean Mining

There is a requirement to get necessary regulations in place and to settle federal/provincial jurisdictional issues.

- Ship-building/Shipping

Protection is needed for the ship-building industry in Canada. In updating our fleet, both government and commercial orders should be filled by Canadian builders.

Canada should strive to build "smart" ships as opposed to "strong" ships. The government's policy of achieving excellence in operating on and below ice-covered waters should be reinforced.

We should consider conducting scientific research from vessels other than those specifically intended for that purpose, e.g., military ships.

- Defence

Fisheries and Oceans should urge National Defence to put a greater emphasis on water. DND is a difficult department for industry to approach. Perhaps this problem could be remedied by creating in Canada the equivalent of the U.S. Office of Naval Research.

- Oceanic Manufacturing and Services

- . The financial support programs such as IRAP and the UP fund should be reviewed for adequacy.
- . There should be increased contracting-out by government, and the year-to-year level should be more stable than in the past. Specifically, it was proposed that the government develop a charting policy and announce the amount of funding available for contracting-out.
- . Industry and universities must be made aware of the government's marine science plans. Furthermore, the role of both sectors should be clearly articulated and their activities more closely coordinated.
- . Technology transfer should be an integral part of oceans policy.





## CLOSING REMARKS BY CO-CHAIRMEN

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### John Stirling

It seems to me that we have come a long way in two days. We have covered a lot of territory and a lot of thought-provoking ideas have come out. In the last hour or so you have had detailed feedback from the heads of the various working groups that have been active over the last two days. Dr. Meyboom and I felt from the beginning that our mandate as co-chairmen really is to identify a limited number of clear and large issues that should be addressed. Therefore, what I propose to do is to summarize them and perhaps Dr. Meyboom might wish to fill out parts of the skeleton.

Of all the things that have been said over the summation and the discussions that we have had, it seems clear enough that the consensus of the group is that we need to review and restate our oceans policy. Comments have been made that we had a policy in 1972 which was not really addressed, but policies are like everything else --- they have to be worked at steadily. Therefore, I see no apology whatsoever in suggesting, first, that we should develop a clear oceans policy for the country in order to reaffirm and state what our national objectives should be. We would expect that the policy would focus on maximizing the economic benefits to Canada.

It seems that it would be appropriate for the Department of Fisheries and Oceans to spearhead that request for a new policy, even while recognizing that other ministries have key roles to play. I think the speakers, in the last hour or so, have identified why and who they would be. Second, it seems that we have all felt considerable benefit from this get-together over the past two days. My compliments to the chef for organizing it and for the fashion in which it was done. We had a well-balanced group, which leads us into the second, most critical item, which is that we agree that we need something along the lines of a national oceans council. I was little amused by one of the descriptions of the self-destructing organization. It sounded a bit like one of my company's products, "Guaranteed for a limited life. But don't look - it will vanish", but I do not think you really mean that! Seriously, I do think we need to structure a council that will represent the interests of industry, researchers, universities and the proper government departments, to work on the development of a national policy and the input that will be required. I think that the idea of setting up a temporary structure on short notice is a good one because that will help the development of a more permanent structure. Some of the words that were used in this context were good ones: the need to target objectives, to focus the resources we have. That is a good way to approach this sort of thing. The other thing which I feel is important is that we try to keep the proportions similar to the proportions of this particular gathering. This is obviously too large for a council, but we have had, over these last two days, a very large cross section of people who have had something to say. It would add to this council's effectiveness if DFO would appoint a liaison officer to act as the receiver and the coordinator of the activity. Perhaps Fisheries and Oceans will be the sparkplug to get this going.

The third item that we really have to look at is our oceanic legislation. Perhaps I was not the only one who found it a little bit surprising that we really did not have a clear legislative handle on our extended economic zone. I guess, as we listened to the participants, we realized that it is one thing to say "Yes, that's our limit", but if your policies and legislation, in particular, are not coherent, then nobody really knows what the rules are. That makes it difficult for people, be they industry or researchers or whomever, to really understand what they can do in that area of opportunity. Therefore, a third output of this conference has been to identify the need for oceanic legislation. This involves many of the points that have been raised, including questions as to whether the Law of the Sea should be ratified in full or in part. I think, as one of the speakers mentioned, that it would do two things: one, it would enhance Canada's participation in legal matters related to the ocean, as I understand we have a rather limited legal training in that area, and two, it would certainly focus Canadians' interests on the sea and this critical resource.

Therefore, I believe we have three very clear mandates to act on coming out of this meeting. These are all well supported by the detail that has been put together. Before turning over the podium to Dr. Meyboom, I would like to echo the words of one of the speakers who, a few minutes ago, said, "The time to act is now." Maybe some of us, when approached about this forum, might have wondered if this is an appropriate time to concern ourselves about the oceans given the downturn in activities. However, I think that there has been a lot of momentum developed here in the last two days, a lot of things have been begun. It would be a shame not to see it continue. Thank you very much.



### Peter Meyboom

I feel a bit like a satellite that has received ten billion bits of information and now I am supposed to make an image and preferably a map out of all of that. First of all, Mr. Minister, I think that you, the Department, all of us have been served extremely well by this gathering.

I would like to make some personal observations. I would like to give a few answers because I really felt that neither John nor I were permitted to participate in the debates and the discussions over the last few days. There are a few things that I do not want to let go unchallenged. It is a pity Mr. Walker is not here because they are mainly addressed to him. I would like to paint a background as I see it and then reinforce the themes that have just been identified and distilled by my colleague.

First of all then, some observations. As you know, this meeting was structured for two days. The first day was to describe the status quo and the second day was to look into the future. I have learned that you should not ask a gathering of this kind to assess the status quo because all you end up with is what I call a lament by well-dressed gentlemen. By late yesterday afternoon, I was puzzled that we still have anything going in Canada at all. I was fairly depressed after having listened to the various study groups. However, if you listen to them in terms of the future, you understand why there is still business in Canada.

As far as Mr. Walker is concerned, he advises you, Mr. Minister, through us, that the entire problem of oceans policy is simply one of assigning property rights. He compares the government to a pious bear who is saying grace for what he is about to receive, then getting its clutches into the private sector. He was marvelously provocative and said a few things that I quite disagree with. I do not think that exploiting the oceans is as simple as populating the prairies and the reason why I came to that conclusion is simply because of the physical difference. Activities on land are visible: somebody who builds a farm builds a visible structure, whereas much of what happens in the oceans is invisible. In terms of occupying the oceans, I, for one, am on the side of freedom of the seas because I believe that it guarantees a number of other freedoms that otherwise might be in jeopardy. I was interested in his view that the rise of commodity prices is attributable to the increase of the size of the public service. It reminded me a bit of the story that we got in first-year statistics showing the relation between the number of babies born in the city of Paris in the month of May and the return of the storks. The proof that followed, of course, was that babies were brought by storks. Nevertheless, the views expressed by colleagues like Mr. Walker are essential in our society in that they stimulate public debate on important issues.

Let me now turn to business for a moment. The oceans industry, as I have learned, is not large. Two hundred and seventy-five million dollars per year revenue, down one hundred million from two years ago, as compared to the \$1.7 billion in government expenditures. So indeed, as Mr. Walker was saying, the ocean is infested with government activity and there is an important lesson there because we have to keep the image of that pious bear in mind. The size of the industry makes me wonder whether an association or a council could have any influence at all, and yet, I would like to amplify what was identified by my colleague, namely the need for such a council. The assessment, as I heard from the various speakers yesterday, is that on the whole, the government services in the ocean are adequate but that the research is largely invisible and there is a need to have some better communication between those two communities.

Canada does not see itself as a maritime nation. That is true for most of our politicians and, from what I learned yesterday, certainly true for our bankers. The oceans are a hostile environment. Bankers are already sufficiently worried, and do not want further nightmares added to their already troubled sleep.

Another thing that struck me was the collapse of the oil prices and the effect it has had on everything that business is involved in. I remember that the rise in the oil prices had an equally disastrous effect and, of course, the only conclusion one can come to is that whatever the level, oil prices have a disastrous effect on society.

I would like to turn to issues we did not discuss. In particular, I believe two things ought to be mentioned at least once in this forum: the first one is people and the second one is jobs. People ought to be mentioned in relation to a number of terms that are constantly being used, such as: technology transfer, coordination and information. We talk about it easily and seek institutional reform to encourage, legalize, institutionalize, or legislate technology transfer, information and coordination. I think a crucial element is completely overlooked which has nothing to do with institutions but has to do with people.

Let me turn first to technology transfer. There are people who have struggled and who are single-mindedly obsessed with something they believe in. As a rule, our institutions are not very sensitive to those people. Working with clarity, determination and enormous eloquence for years and years, these individuals have in fact accomplished the kind of technology transfer that some were proposing be done by an institution. I am not saying that that is unnecessary, but I believe that the best thing government institutions can do is to become more sensitive to these special individuals. When I worked in the Department of Finance many years ago, I was involved in venture capital. In venture capital, a good banker was a banker who knew how much we needed innovation, how much we needed new ventures, and who could recognize people who were obsessed with something, and who had the necessary drive and skills to accomplish it. This drive is something we have to be far more sensitive to with respect to technology transfer.

The second thing is coordination. We say that coordination has to be formalized. I do not believe that at all. I believe that coordination flows from leadership. We have a perfect example in the organizer of this conference,

Mary Zamparo. She has no legislative mandate to speak of and yet she coordinated the conference and did exactly what was necessary in terms of helping the Minister to get the kind of information that he is now getting.

Finally, regarding information, what we need are people like those in this room, for example, Dr. Fournier. Dr. Fournier this morning was speaking as a born educator, a born teacher, who has something to say and says it well. So when we say we have to have a better exchange of information, I think what we need is to have more opportunities to speak up, to listen, to have a dialogue, a debate. Many issues are controversial. Nevertheless, they have to be discussed, they have to be listened to, they have to be understood.

I also believe that our discussion about jobs has been inadequate. Innovation has its down side. Although you may advocate rationalizing our ship-building industry, that means that we probably only need two shipyards in Canada: one on the east coast and one on the west coast, with perhaps one in between, but not the seven or eight we have now. That means the loss of jobs.

The same applies to fisheries. Strictly speaking, the entire catch of the inshore fishery in Newfoundland can probably be taken by two factory trawlers, yet sociologically and humanely speaking, one cannot eradicate the jobs of thousands of inshore fishermen in the absence of meaningful alternative employment. Therefore, simply to push high-technology innovations is, in my view, a bit naive. If one goes to a minister, and from a minister to a cabinet about these matters one cannot be completely blind to this kind of reality.

Now, I would like to amplify some of the things that my colleague, John Stirling, has just said. The first thing is that there is a need for a policy statement on oceans. That is clear. Everybody agrees on that, but it has to be done in consultation with other departments. It cannot be done by means of territorial dispute. We cannot start by saying that from now on DFO will take over half of Energy, Mines and Resources. In my view that is a fruitless and puerile approach. It has to be done in consultation with others.

There is a strong consensus that we must salvage those aspects of the 1972 MOSST policy on oceans that can be salvaged, particularly with respect to the expertise on and underneath ice. An issue that was identified by Phil Lapp was the difference between a smart ship and a strong ship. This is something that we should pursue because Canada is good at building smart things.

Regulatory reform is a must, contracting-out is a must. Oceans and not only space, must be seen as a new frontier. On trade policy the audience, Mr. Minister, is schizophrenic. In some instances it is to Canada's advantage to advocate free trade and in other instances to our disadvantage. So, we agree on the policy but there must be a great deal of sensitivity, concern and a realization that it is not all black and white.

Secondly, there is a need for a national oceans council. It is premature I think, Mr. Minister, to say what the terms of reference, et cetera, of such a council would be or should be. There are various discussions needed about that, but the suggestion that has been made by at least two teams is that we have some interim measure to help the Department work out initial policy statements.



I think this is an enormously important suggestion and we should accept it with gratitude. How it will go to phase two, whether the chemistry will be right, whether the industry is big enough to carry it, are all questions of the future. We know in the Department how useful those councils are. For example, we are working with the Fisheries Council of Canada and the B.C. Fisheries Council every day. But we also know what financial support is behind those two councils and whether that is possible with this industry I cannot judge at the moment, but I have some doubt.

The notion that there should be an advocacy group within DFO is a very interesting one, and having a liaison officer is a very important idea. That is something we should consider. On the whole, I think we should let the tide flow a little on the notion of a national ocean council and get back to it later. Something very good will come out of it, I predict, either in the long run or in the short run. If as much comes out of that exercise as has come out of these past two days, I would be extremely grateful.

Finally, on the legal side, there is probably a need for a comprehensive look at our oceans legislation. First of all, there is a need to ratify the Law of the Sea, to confirm the jurisdictions, which in itself will lead to all kinds of priorities and activities. The group dealing with legislation has given us a very useful and important menu of activities, all of which should be referred to in a Memorandum to Cabinet in December.

I would like to end with thanking, first of all, my colleague John Stirling. We have developed, in 48 hours, an extraordinary collegial relationship and I am pleased that between the two of us we have been able to make the beginning of an image and perhaps even of a map. Secondly, I wish to thank the chairmen of the various groups for doing all the things you did, positive and negative. Finally, my particular thanks to Mary Zamparo for organizing this event in such an exemplary fashion. Thank you very much.

## APPENDIX I

### A PERSPECTIVE ON CANADIAN OCEANS POLICY

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*In 1973 an Oceans Policy for Canada was announced by the Minister of State for Science and Technology. The announcement was stimulated by the major expansion of offshore exploration drilling for hydrocarbon resources and associated activities occurring at the time in arctic waters, and the challenge to sovereignty of the voyage of the Manhattan through Canada's Arctic. The policy called for recommendations to Cabinet on national policies and guidelines for understanding, using and managing Canada's oceans; in particular, as they pertain to operations on and below ice-covered waters.*

*In order to generate such recommendations, a study was conducted under the direction of Philip A. Lapp which included two seminars organized by Dr. Lapp, designed to elicit views and ideas from a wide cross-section of Canadian oceans-related interests. The study resulted in 33 program recommendations, many of which have been implemented over the intervening years. The following report, A Perspective on Canadian Oceans Policy was written by Dr. Lapp, and presents his own views looking backward 12 years, in the light of today's events and circumstances.*

#### 1. Introduction

In July 1973, the Minister of State for Science and Technology announced an Oceans Policy for Canada based on the premise that Canada must develop and control within her own borders the essential elements needed to exploit offshore resources. The important elements of the policy provided that:

- Canada stimulate development and effective participation of Canadian industry in the plan to see that Canada controls the essential industrial and technological ingredients to exploit offshore resources.
- Special emphasis be given to a wide range of marine science and technology programs relating to management of marine environment, renewable and non-renewable resources, development and maintenance of ocean engineering at universities and in government laboratories and better forecasting of weather, currents, ice and similar atmospheric and oceanic factors.
- Canada, within five years, achieve world-recognized excellence in operating on and below ice-covered waters.
- Canada stand equal or superior to foreign governments or large multi-national corporations in developing and maintaining a current information base about its renewable and non-renewable offshore resources.

At the time, the oil and gas industry was on the threshold of major expansion of offshore exploration drilling activities where sea ice is a continual hazard in the Beaufort Sea and off Canada's east coast. Approximately one year earlier, in August 1972, the Arctic Waters Pollution

Prevention Act had been proclaimed which asserted pollution control rules in a zone 100 miles out to sea from the Arctic islands. It was spurred by the voyage of the Manhattan, and the Arrow disaster in Chedabucto Bay in 1970. The quest for new hydrocarbon resources was leading to arctic waters and the need to examine a wide range of new scientific and technological issues, as well as the implications of ownership of such resources and related sovereignty matters. While certain industrial aspects of the new policy found their way ultimately in to the New Energy Policy, scientific and technical aspects were to be emphasized in a continuing review of ocean policy by the Ministry of State for Science and Technology (MOSST). The Minister, in consultation with interested departments and agencies, was to recommend to Cabinet national policies and guidelines for understanding, using and managing Canada's oceans.

In order to generate such recommendations, a study was initiated by MOSST which focussed on ice-covered waters and related marine science and technology issues of the policy. The study took place in late 1973 and early 1974 under the direction of Philip A. Lapp, and included two major seminars designed to canvass the appropriate people for ideas, opinions and recommendations. There has been no significant re-statement of an Oceans Policy since, and so it was considered appropriate to review what was recommended in 1974, and compare circumstances then and now on the occasion of the Oceans Forum in September, 1986 when policies were again reviewed by a wide cross-section of those involved with Canada's oceans. Significant progress has been made on many but not all fronts during the intervening 12-year period.

This Appendix summarizes the 1974 study approach and recommendations, and attempts to trace the evolution of major program elements over the following decade, culminating in the current circumstances that form the setting for Oceans Forum.

## **2. The 1974 Study**

Among the important elements of the 1973 MOSST policy statement was the provision that "Canada, within five years, achieve world-recognized excellence in operating on and below ice-covered waters". The 1974 study, entitled "The Identification of Requirements Critical to Operations On and Below Ice-Covered Waters" responded to the policy statement. It was prepared for MOSST, and operated through the ad hoc Advisory Committee including:

- Ministry of State for Science and Technology (MOSST)
- Department of the Environment (DOE)
- Ministry of Transport (MOT)
- Department of Energy, Mines and Resources (DEMR)
- Department of National Defence (DND)
- Canadian Committee on Oceanography (CCO)

The two seminars were structured into working groups organized under headings related to operational activities. The first seminar, held in Toronto in February, 1974, consisted mainly of arctic operators, defined as those engaged in commercial activities on and below waters where sea ice is encountered. Industrial people mainly attended the first seminar which was divided into the following working groups:

1. Surveying
2. Drilling and Completion
3. Pipelines
4. Transportation - ships
5. Transportation - surface vehicles
6. Underwater
7. Marine Terminals



The second seminar was held in Montreal a month later. It focussed on arctic waters support services and used, as primary input, the recommendations from the first seminar. Attended mainly by government people and those responsible for providing support services in the north, the second seminar addressed itself to specific R and D programs that should be supported by the federal government, and to the extension of existing services in the Canadian Arctic required by the arctic operators. Six working groups were formed:

1. Surveying, Scientific and Other Mobile Activities
2. Fixed Facilities and Operations
3. Water Surface and Underwater Vehicles and Related Operations
4. Air and Hard Surface Vehicles and Related Operations
5. Human and Environmental Factors
6. Fisheries

Each working group concentrated on the services needed to support the activities implied by its title.

Approximately seventy people attended each seminar. The second seminar was attended by a representative from each of the seven working groups of the first - in most cases, the Chairman. A total of 200 recommendations were generated by the two seminars. They were used as an inventory of suggestions from the approximately 125 experts selected as "the best there is" in their particular fields in operations on and below ice-covered waters. The recommendations were culled, sorted and fitted into priorities in accordance with an overall master plan.

The recommendations were grouped in four program areas which, in order of priority, were:

1. Support services to arctic transportation
2. Arctic vessel - icebreaker and ice-strengthened cargo ships
3. Oilspill countermeasures
4. Fisheries technology

The number and nature of seminar recommendations are shown in Figure 1. Approximately two-thirds of the recommendations referred either directly or indirectly to arctic transportation. Indeed, it was recognized that arctic transportation is a common requirement for almost all operations pertaining to waters where sea ice is encountered, including oil and gas exploration, mining, fisheries, resupply of arctic bases and governmental obligations such as surveillance, sovereignty control and law enforcement. Thus a high achievement in arctic transportation is a necessary condition for success in all operations associated with ice-covered waters.

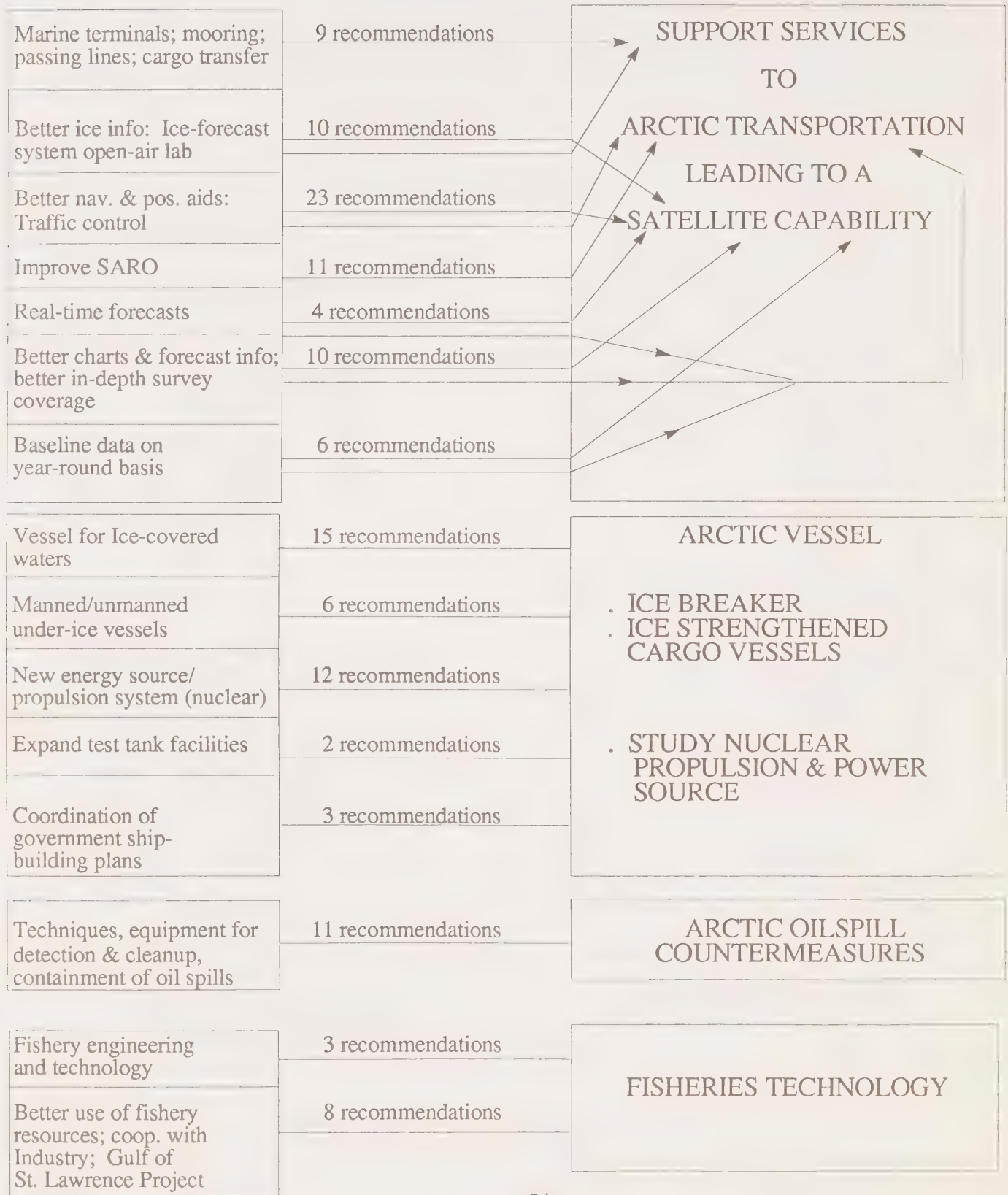
The next step was to request each government department, ministry, or agency affected to study the recommendations and order them in terms of its own interests and external relationships. The responses were structured in accordance with the following framework:

#### 1. Technology, Design, Construction and Operations

This section dealt with such vehicles as cargo, patrol, and fisheries vessels, icebreakers, submersibles and submarines, barges and tugs, tracked and high flotation vehicles, ACV's and aircraft. Matters related to engineering, design, test and manufacturing facilities were emphasized.

Figure 1

# HIGH PRIORITY SEMINAR RECOMMENDATIONS



## 2. Support Services

Those serving transportation include the design and construction of docks, marine terminals and airports, navigation systems, communications, hydrographic surveys and charts, weather and ice forecasting, search and rescue, pollution control, relevant scientific and technical information systems, etc.

## 3. Infrastructure

Policy matters concerning departmental jurisdictions and interdepartmental organizations were covered in this section, which also included views or positions concerning the creation of an arctic command and control system, or an arctic operations coordination centre.

## 4. Legislation and Regulations

Some recommendations referred to proposed new legislation, such as the mandatory use of Canadian flag carriers, alterations to existing laws and regulations and the use of technology to relieve the constraints imposed by present legislation. This section dealt with these issues and other related policy matters.

## 5. Research

Included in this category were research into materials used in the Arctic, oceanography, the physics and engineering properties of ice and forces in the ice pack, the interaction between oil and ice, and between the atmosphere and the ocean. Also, it included engineering research into new hull forms and model simulation, new types of terminals for surface ships and submarines, ice surface modification for airstrips and surface vehicles, iceberg control and remote-sensing, etc.

## 6. International Joint Programs

There were a number of opportunities for Canada to participate in international joint programs, some in research such as AIDJEX, and some in development and commercial ventures such as EOS with the West Germans. This section covered departmental views with respect to such programs mentioned in the recommendations, and introduced new or other international opportunities not raised or covered in the two seminars.

Replies were received from:

- Ministry of State for Science and Technology
- Ministry of Transport
- Department of the Environment
- Department of Energy, Mines and Resources
- Department of National Defence
- National Research Council
- Department of Indian Affairs and Northern Development
- Department of Industry, Trade and Commerce

The result of the responses was a selection and ranking of program areas as shown in Table 1. The rationale for the headings selected was that they lend themselves to progressive levels of sophistication with long-as well as short-range implications. The arctic vessel serves the high Arctic; fisheries, the more southerly regions of ice-encumbered waters (Labrador Sea and Gulf of St. Lawrence). By setting such priorities, posterriorities were implied - surface vehicles, submersibles and aircraft did not get singled out for special treatment, except indirectly through support services to arctic transportation.

Detailed plans for an integrated program were developed in consultation with related government groups. Eighteen were contacted, involving some 50 people, in order to learn firstly the present level of effort and programs underway; secondly, the multi-year plan; and finally, what might be done to achieve the elusive state of "excellence". This process led to the detailed program structure shown in Table 1, covering 33 proposed programs. Costs also were developed over the five-year period ending 1979-80. The recommended average expenditure rate over that program period was \$40.5 million per year over and above the planned departmental multi-year forecast for the same period of approximately \$53 million per year devoted to R and D associated with ice-covered waters. A detailed cost breakdown appears in the 1974 study report.

The study was predicated on the contention that the attainment of "world-recognized excellence" amounts to the creation of a capacity to provide adequate services and regulatory mechanisms on and below ice-covered waters to meet expanding commercial activities with acceptable environmental and sociological impact. It is worth noting that while the study focussed on ice-covered waters, in fact many of the recommendations affected Canada's ocean regime as a whole, and were not restricted to the Arctic or arctic conditions.



TABLE 1  
Summary of Recommendations

Program	Program No.
<b>1. Support Services to Arctic Transportation</b>	
1.1 Navigation Aids and Position Fixing	
. Loran C Station Location Study	1
. Loran C Receiver Study	2
. Electronic Buoy Replacement System	3
. Visual Aid Survey	4
1.2 Traffic Management	
. Technical Requirements Study	5
1.3 Search and Rescue	
. Arctic Search and Rescue	6
. Underwater Search and Rescue Study	7
1.4 Weather Forecasting	
. Weather Station and Location Study	8
. Network of Automatic Weather Stations	9
. Operation of New Observation and Satellite	10
. Operation of Additional Computer Facilities	11
1.5 Ice Forecasting	
. SLAR Installation	12
. Additional SLAR Operations	13
. Operation of Additional Aircraft	14
. Satellite R & D Program	15
. Ice Thickness Sensor R&D Program	16
. Relay and Recording System Design and Development	17
. Iceberg Data Base Development	18
. Ice Archives and Data Bases	19
1.6 Hydrographic Surveys, Charts and Maps	
. Extended Season Operations	20
. Through-Ice Depth Profiler R&D Program	21
1.7 Marine Terminals	
. Five Marine Terminals	22
. Arctic Engineering Research Laboratory	23
1.8 Communications	
. Sea Ice Satellite Imagery Distribution	24
. Ice Data Communications System	25
. CTS Experiment	26
1.9 Arctic Publication	
. Editorial Support	27
<b>2. Arctic Vessel</b>	
. Accelerated Icebreaker Design	28
. Ice Tank	20
. Nuclear Propulsion Study	30
. Arctic Engineering Research Vessel	31
<b>3. Oilspill Detection, Containment and Cleanup</b>	
. Research and Development	32
<b>4. Fisheries</b>	
. Freezer-Trawler for Hamilton Banks	33

### 3. Program Evolution

The recommendations of the 1974 study were not all new program initiatives. Indeed, some of them reinforced what was already underway or what was contained within a multi-year plan. Often it was a matter of accelerating an existing program, or adjusting its priority to satisfy a new oceans policy regime.

Over the intervening years many of the recommendations have been followed, not necessarily because of the 1974 study, but because events, logic and external pressures have driven government to take action which coincided with the recommendations. The following paragraphs attempt to trace the evolution of oceans programs using the general structure of Table 1.

#### 3.1 Support Services to Arctic Transportation

The evolution of support services to marine transportation in general and arctic transportation in particular has responded to the growth in shipping and the needs of offshore oil and gas exploration over the past 12 years. The Canadian Coast Guard (CCG), the Atmospheric Environment Services (AES) and the Canadian Hydrographic Service (CHS) are the principal agencies responsible for support services to marine transportation. The following headings deal with particular issues identified in the 1974 study.

##### a) Navigation Aids and Position Fixing

The development and control of navigation with respect to the oceans generally falls under the mission of the CCG which includes:

- . The Way - to ensure that shipping has access to ports in Canada;
- . The Vehicle - to ensure that ships are in a seaworthy condition before making a passage; and
- . The Voyage - to ensure that voyages are prosecuted as safely and expeditiously as possible.

A principle CCG management activity is the development of en route navigational way systems and support services, and enforcement of the Navigable Waters Protection Act. The marine aids to navigation system in Canada consists of approximately 16,000 navigational aids of different types, including buoys, radio beacons Decca, Loran C and Omega. They also include ongoing operational information to mariners on the status of the CCG navigational aids and on the aids systems required by users.

The most significant advance over the past decade is the implementation of the U.S. military's Global Positioning System (GPS) which provides a continuous global long-range positioning service including Canada's Arctic using a constellation of low earth-orbiting satellites. Civilian and foreign agencies will have access to a low accuracy version of GPS which could augment and begin to replace the current long-range positioning systems such as Loran C and Omega by the late 1980s or early 1990s when GPS becomes operational (its introduction has been hampered by delays in the Shuttle program following the Challenger accident). GPS-type technology and more sophisticated electronic positioning techniques ultimately should find their way into the entire aids to navigation system including the current buoy networks.

## b) Traffic Management

Another principal CCG management activity is Vessel Traffic Management (VTM) at a range of levels from local harbour control to movement control in major rivers and connecting channels, and ocean control systems such as the Eastern and Arctic Canada Traffic System ECAREG/NORDREG. The 1974 study foresaw traffic problems in arctic confluence zones and recommended the general requirements for arctic VTM be studied. Events have not led to the traffic anticipated, and it is now doubtful that LNG or oil tankers will be used to any major extent to transport hydrocarbons from the Arctic, at least before the year 2000.

However, in harbours and in confluence zones on the major shipping routes, VTM systems will need to keep pace with traffic growth. It is expected that the volume of shipping in all Canadian waters will increase by a factor of 3.5 in the year 2000 from the level achieved in 1983. (The Oceans Sector: An Overview, DFO 1986, p. 27).

## c) Search and Rescue

CCG also develops and maintains a marine emergency response organization and capability. Such activities include the development of national and international contingency plans for pollution clean-up at key locations, and the provision of the marine element in the national search and rescue organization. The level of support for search and rescue in Canada tends to ebb and flow with the frequency and severity of incidents involving loss of life. Since marine traffic in arctic waters has been less than expected, there has been little impetus to perform the studies recommended in 1974.

## d) Weather Forecasting

On behalf of CCG, the AES provides the marine weather service. The total system operated by AES can be regarded as a massive "information pump" integrating data from many sources, processing this data and, through the use of prediction models and other techniques, generating weather and ice forecasting products that are distributed to weather service offices and user agencies throughout the country and beyond as required.

All ocean management functions need weather and ice services to varying extents - fisheries for the safety of fishing vessels and crews, oil rigs for the safety and security of drilling operations, all forms of marine transportation for safety and economic routing, regulatory agencies for establishing regional load-line limits and vessel specifications, etc. Activities in the Arctic are particularly dependent on AES services because of the very real environmental hazards faced by ship and rig crews. The 1974 study identified the need for more observation points in the Arctic, new satellite receiving facilities and additional computer capability at Arctic Weather Central in Edmonton. During the past decade, AES has certainly expanded its computer facilities at all of its stations and has extended its synoptic forecasting capacity through its new supercomputer at the Canadian Meteorological Centre (CMC) at Dorval, Quebec. Further the new satellite-based communications system being installed by AES will improve data throughput to CMC, and ensure a more extensive and reliable broadcasting of its forecast products to users including mariners.

Before shutting down in the Beaufort Sea, the drilling industry operated its own weather and ice forecasting system there including aircraft and helicopter observation flights.



#### e) Ice Forecasting

AES also operates the Ice Services Program. The 1974 study was heavily oriented toward improvements in this service (8 recommendations) because of the importance of ice information to all operations on or below ice-covered waters. Ice information is needed in all regions off Canada's coast line where ships will encounter ice. In the winter, the regions of concern are the St. Lawrence Seaway, Gulf of St. Lawrence and the eastern seaboard including Newfoundland waters, the Grand Banks and eastern approaches. In summer, the important regions shift north to the Labrador Sea, Hudson Bay and Strait, and the major shipping routes in the Arctic.

The type of ice information required includes the extent of coverage; type, age and estimated thickness, movement; distribution and height of ridges; snow cover; location, extent and size of leads and polynias; location and drift of icebergs.

Since the 1974 study, the AES Ice Services Program has been extensively improved. Many of the recommendations have been implemented if not specifically, at least in intent. For example, the ice observation aircraft use radar extensively, but since 1974, synthetic aperture radar (SAR) has been shown to be more effective for some types of ice reconnaissance than the side-looking aircraft radar (SLAR) recommended in the study. Also private industry now has developed its own operational SLAR and SAR airborne systems.

AES's Ice Central in Ottawa is planning to acquire the Ice Data Integration and Analysis System (IDIAS) which is a major software system that will generate the output products needed by operational users. Planned products include the Current Ice Chart, showing the present location of ice, the Forecast Chart (24 hours into the future), Forecast Ice Pressure Charts, Weather Pressure Charts, Iceberg Location Chart and radar imagery. (The iceberg service is presently on a four-year hold due to funding constraints).

A limitation to the present weather and ice forecasting system is the quality of charts received on board. Significant improvements can be expected when the transmitting medium switches from analogue to digital facsimile as planned.

#### f) Hydrographic Surveys, Charts and Maps

The CHS has a mandate to gather and publish hydrographic data and navigational information relating to Canada's navigable waters. The principle issue in 1974 was the lack of hydrographic charts in the arctic regions and the need to update old charts in certain waters near Newfoundland. Since then, technology has made such surveying more efficient and while there still are significant gaps in arctic waters, many of the regions of concern in 1974 have been charted.

New technology is having a major impact on Canadian hydrographic surveying including better positioning systems, the use of airborne lasers for shallow water hydrography and the electronic chart. None of these developments were anticipated in 1974, but the need for charts then was very apparent.

There has also been a significant program in the measurement of tides and currents in arctic waters. These measurements are most important in the study of mass transport mechanisms, predicting iceberg drift and in determining the manner in which oil spills disperse.



#### g) Marine Terminals

The 1974 study saw the need for extensive marine terminal construction created by the planned transportation by sea of hydrocarbons from the Arctic. Since such plans did not materialize, terminals did not become an issue although drilling activities and the necessary support services did involve the construction of some marine terminal facilities by the industry to serve its own purposes (e.g. at Tuktoyaktuk).

The study also recommended the establishment of an Arctic Engineering Research Laboratory to be operated by industry for NRC at some location in the Arctic to do R & D on ice-resistant structures, marine terminals and other structural engineering problems associated with arctic conditions. This recommendation was not implemented.

#### h) Communications

Since 1974, communications facilities in the Arctic and generally in the marine environment have improved considerably. In 1974, a major concern was the ability of existing facilities (mainly HF) to communicate ice and meteorological charts and imagery of acceptable quality. Today, there is a satellite communication system dedicated to oceans users - Inmarsat, to which Canada is a signatory through Teleglobe Canada. This international body became operational in 1982 and leases spacecraft from ESA, Intelsat and Comsat General. It provides voice and telex service to ship earth stations which are purchased or leased by individual ship owner/operators. Current costs are in the order of \$12/minute per voice channel which can double as digital facsimile links for the transmission of charts and imagery. As a geostationary satellite, Inmarsat's services are limited to latitudes below approximately 70-75 degrees. When Canada's Mobilsat is launched, it too will provide low-cost communications services to vessels as will other mobile satellite services that will be offered competitively in future.

Thus satellites have answered the concerns expressed in the 1974 study. One recommendation not implemented was the CTS experiment of transmitting video to ship at sea using that satellite; however, such a test was tried successfully using Anik B to relay video to a drill ship in the Beaufort Sea.

#### i) Arctic Publication

The provision of editorial support for a technical monograph series of publications on arctic subjects was one of the recommendations not implemented.

In addition to the above, there have been other important events and initiatives in connection with support services in the Arctic. In general, they related to the advancement of the physical sciences and include:

- extensive R and D under the Arctic Marine Transportation Research and Development Program, an interdepartmental effort led by DOT;
- certain aspects of the Energy R and D program; and
- the Northern Oil and Gas Action Plan.

It is worth noting also that the oil and gas industries in the last 10 to 15 years have made very significant contributions to excellence in ice-covered waters operations. Probably the most notable was the development of artificial islands in the Beaufort Sea that were used as drilling platforms.

### 3.2 Arctic Vessel

The 1974 study rated a Canadian capability to design and construct icebreakers and ice-strengthened vessels second highest in priority below support services to arctic transportation. Canada has the second-largest icebreaker fleet in the world, all built in Canada. It is about half the size of the Russian fleet, but nearly twice the size of the U.S., Swedish or Finnish fleets. The participants strongly believed that if Canada did not take the initiative in arctic ice vessel technology and develop its related industries during the period of exploration prior to major resource extraction, then an opportunity to gain and maintain a world lead would be lost, perhaps forever.

At the time, CCG was studying two large icebreaker designs: a Polar 7 which could operate in most parts of the southern Arctic all year, and a Polar 10 which would be capable of all year round operation in the high Arctic. The study recommended an acceleration of the Polar 7 study. Several small CCG icebreakers have been built in the intervening period; the larger icebreaker design (now called Polar 8) has just been finalized. The Speech from the Throne of October 1, 1986 states that "Canada will construct one of the most powerful icebreakers in the world to enhance our sovereign rights and to contribute to the development of the North". In the meantime, highly economic icebreakers have been built and operated by the private sector oil and gas industry for the Beaufort Sea; for example, Dome Petroleum's icebreaker Kagoriak.

It was believed that Canada should have a strong indigenous ship-building industry capable of advanced icebreaker and ice-strengthened vessel design. For this purpose, it was recommended that an ice towing tank be constructed to test and compare alternative hull forms and structures using scale models. Such a facility has been built by NRC at Memorial University in Newfoundland.

A nuclear propulsion study for the Polar 10 icebreaker was proposed. At the time, hydrocarbon fuel prices were such that the break-even point between conventional and nuclear power was in the order of 60,000 shp. Nuclear power for icebreakers remains as it did in 1974 - in the future!

Finally, the study called for the construction of an Arctic Engineering Research Vessel to be used as a testbed to increase knowledge in the design of ice-strengthened vessels. Indeed, such an engineering testbed has been built - the MV Arctic. In 1975, the Government agreed to participate with a group of shipowners and shipbuilders in the construction of an Arctic Class 2 icebreaking cargo ship. The CanArctic Shipping Company Ltd. was established which is 51 per cent government-owned (via Transport Canada), the remaining shares are held by a consortium of private shipping companies.

The MV Arctic was designed specifically for arctic conditions and in particular to export lead and zinc concentrates from the Nanisivik minesite on Baffin Island to Europe. She was built by Port Weller Dry Docks in 1978, modified in 1985 to permit the transport of oil from the Bent Horn demonstration project, and again in 1986 to increase the Ice Class of the vessel to Class 4 equivalency. The MV Arctic has been used as a structural testbed, and data has been gathered on hull stresses and on the propulsion and other machinery on board. Also the vessel has been used to develop ice transiting techniques using both continuous and ramming methods. It has been used to study the relationship between shipping in the high-arctic environment, the ice environment, navigation in the Arctic, shiphandling and manoeuvring in severe ice buildup conditions, cargo handling at sub-zero temperatures, management and safety on arctic ships. In its new condition, the vessel will be used to solve problems of mid-winter arctic operations, navigation in ice in darkness, communications in the high Arctic, vessel and crew safety and operations management.

### 3.3 Oilspill Detection, Containment and Cleanup

Ranking third in priority among the study recommendations, oilspill countermeasures were considered to be particularly significant first because of the then rapidly expanding exploratory drilling program in the Arctic where there is always a danger of a blowout; secondly, because of the unknown properties of crude oil under the ice and in near-freezing seawater. In 1974, the work that had been done on arctic oilspills was "woefully inadequate"; there did not appear to have been either a contingency plan or even some workable ideas on what course to follow in the event of a major disaster. Thus the study recommended that a "coherent, succinct and well-articulated program on arctic oilspill countermeasures be created by a task force at an appropriate government facility under strong leadership".

In fact, in the years following 1974, a number of government initiatives were taken under the leadership of the Department of the Environment, responsible for the scientific support role, and the Department of Transport in its operational role. For example, the emergence of the Environmental Assessment and Review Process. Today, Canada is in a stronger position to deal with arctic oilspills and research continues. Undoubtedly, as in all emergency measures activities, the emphasis will fade until drilling operations pick up again.

### 3.4 Fisheries

Fourth in the priorities groupings of the study recommendations was fisheries as they pertain to ice covered waters. It was recommended that Canada design, construct and operate a new type of fishing vessel - a freezer trawler capable of operating in the ice-congested waters of the Labrador coast in winter - in particular, the Hamilton Banks. Over the intervening years, and until recently, the offshore fishing industry has experienced difficult times. As a consequence, the proposed freezer trawler program did not materialize. With the advent of the factory trawler, there may no longer be a case for the type of vessel envisaged in 1974.

## 4. The Current Situation

Two very useful documents were prepared by the Department of Fisheries and Oceans for the Oceans Forum which summarize the present situation admirably:

1. The Oceans Sector: An Overview
2. Federal Inventory of Ocean-Related Activities

In looking backwards over twelve years, there have been three salient factors that have shaped Canada's oceans activities and policies:

1. The rise and now decline of exploratory drilling in the Beaufort Sea and off the east coast.
2. The decline and now rise in the fortunes of the offshore fisheries.
3. The establishment in 1977 of a fisheries zone out to 200 miles from shore.

The heavy investment in drilling gave rise to a significant oceanic manufacturing and services industry which is facing difficult times as its major markets have now evaporated. Moreover, governmental restraints in spending have exacerbated the problems of Canada's fledgling oceans



industry. As government moves toward cost recovery of its many support services now provided free or at minimal cost to the user, pressures may be created for private sector initiatives to move in where feasible. It is worth noting that when major exploratory drilling programs were underway, the private sector began to invest in areas that traditionally have been government services such as icebreaker support, environmental forecasting and arctic communications infrastructure.

Notably absent from the 1974 seminars was the subject of the exploration and extraction of non-fuel minerals from the continental shelf, and indeed the whole question of Canada's claims for sea-bed mining rights. It is clear that until Canada has developed a suitable regulatory system to open up the continental shelf for exploration and mining, such commercial activities will be minimal. The same can be said for sea-bed mining which also is being held up until a satisfactory sea-bed mining regime can be developed by the United Nations Conference on the Law-of-the-Sea.

Finally, it is worth drawing attention to one aspect of Canada's ocean regime that has remained unchanged over the past 12 years - the highly distributed responsibility for oceans policy and activities over a large number of departments of the federal and provincial governments. The Annex of the Federal Inventory referred to above shows 14 federal departments or agencies with major responsibilities. Moreover, eight of the provinces have sea coastlines and maritime interests with ministries and agencies carrying oceans-related responsibilities.

It is hoped that the new Interdepartmental Committee on Oceans can resolve, more effectively than in the past, the problems that arise when a multiplicity of entrenched government agencies carry overlapping responsibilities in a single arena - in this case, a precious resource, Canada's oceans.

October 24, 1986

Philip A. Lapp



## APPENDIX II

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